KOOTENAI DEVELOPMENT IMPOUNDMENT

LIBBY, MONTANA

SAFETY PROCEDURES MANUAL

KOOTENAI DEVELOPMENT IMPOUNDMENT

SAFETY PROCEDURES MANUALS

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KOOTENAI DEVELOPMENT IMPOUNDMENT

INTRODUCTION

KOOTENAI DEVELOPMENT IMPOUNDMENT

INTRODUCTION

The Kootenai Development Impoundment and Dam located near Libby, Montana on FSR #401 (Rainy Creek Road) is one of 97 "high hazard" dams in the state of Montana. The Montana Department of Natural Resources and Conservation (DNRC) is the agency responsible for making sure these dams are maintained so as not to present a risk to human health or the environment. The Kootenai Development Company, as owner of the dam, is required to have and distribute an Emergency Action Plan with up-to-date contact information to be used in the event of an emergency.

Working in cooperation with Mr. Arthur Robinson, DNRC Emergency Action Plan Coordinator/Dam Safety Outreach, the Kootenai Development Impoundment Emergency Action Plan was updated and circulated to the responsible parties in March 2007. In order to maintain continuity, this notebook has been prepared to provide a central location for documents pertinent to the safety and management of the impoundment dam, and includes the following:

Emergency Action Plan

Standard Operating Procedures

Maintenance Procedures

EPA Pre-Entry Instructions

Prior Inspection/Investigation Reports

Inspection Forms & Logs

KOOTENAI DEVELOPMENT IMPOUNDMENT

DAM PERMIT

COPY

Operation Permit

KOOTENAI DEVELOPMENT IMPOUNDMENT DAM

KOOTENAI DEVELOPMENT CO.
Owner

An inspection has been performed and an operation plan prepared (pursuant to 84-15-212 and 84-15-213, MCA)

Michele Lemieux P.E.
Approved by

Dam Safety Program Manager
Title

10/8/04
Date

This permit expires on May 25, 2009

State of Montana Department of Natural Resources and Conservation

Dam Safety Program

KOOTENAI DEVELOPMENT IMPOUNDMENT

EMERGENCY ACTION PLAN

EMERGENCY ACTION PLAN

KOOTENAI DEVELOPMENT INPOUNDMENT DAM

Kootenai Development Company
c/o Remedium Group Inc.
6401 Poplar Ave., Suite 301
Memphis, TN 38119

February 1, 2007

Updated: Feb. 15, 2002
July 27, 2003
February 1, 2007

If Kootenai Impoundment Dam is failing or failure seems imminent, call:

Lincoln County Sheriff ..... 911 or 406-293-4112

Emergency Management Agency ..... 911 or 406-293-6295

Robert J. Medler ..... Cell: 901-493-5856
..... Office: 901-820-2024
..... Home: 901-753-5833

Robert R. Marriam ..... Cell: 901-277-9031
..... Office: 901-820-2023
..... Home: 662-236-6956

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I. INTRODUCTION

A. Purpose

The purpose of this emergency action plan (EAP) is primarily to safeguard lives and secondarily to reduce property damage to the citizens of Lincoln County. This EAP includes the area at the junction of Rainy Creek Road and Highway 37 and the county road that leads up Rainy Creek to the impoundment area.

B. Description of Dam

Kootenai Impoundment Dam is in Lincoln County, in NW ¼ of Section 22, Township 31 North (T31N), Range 30 West (R30W), and located on Rainy Creek, a tributary of Kootenai River. It is owned by the Kootenai Development Company, c/o Remedium Group, Inc. of Memphis Tennessee and was originally used as an impoundment for mine tailings by W.R. Grace & Co., Columbia Maryland. The dam was constructed in 1971 with additions (or lifts) made in 1975, 1977, and 1980. Technical data pertaining to Kootenai Impoundment Dam and its structures are shown in Appendix A.

C. Access to Dam

The dam is located 2.6 miles off of State highway 37. As shown on the map in Appendix C, only one road accesses the Impoundment Dam. This road is approximately five miles east of Libby and could become inundated. The nearest telephone is at the subdivision south of Rainy Creek Road intersection located approximately ½ mile south of where Rainy Creek flows into the Kootenai River.

The Kootenai Development dam is located on a USEPA Superfund site and access to the dam is severely restricted. The Forestry Road #401 (also known as Rainy Creek Road) servicing the dam is blocked by a gate near the intersection of Highway 37. **Access must be requested from USEPA (phone #: 406-293-6194 or from the EPA's contractor- CDM (Safety Officer is Shawn Olivera- cell phone #: 406-293-1547).**

Entry into the restricted zone requires special training and adequate personal protective equipment. Decontamination facilities for personnel and mobile equipment must also be available and used when exiting the site.

Kootenai Development has a contractor "on call" who has the required training equipment and trained manpower, as well as knowledge of the facilities. **The contact person is Mike Chapman (home phone #: 406-293-8305; cell phone #: 406-293-1983).**

D. Hazard Area

The evacuation area extends along Rainy Creek to a point where Rainy Creek enters the Kootenai River. Hazards include the possible inundation of State Highway 37 as well as any structures between Highway 37 and the Kootenai River. Inundation and evacuation maps are in Appendix C.

E. Responsibility and Authority

Pursuant to the Dam Safety Act, Chapter 15 of Title 85, MCA, the dam owner is responsible for production, coordination, maintenance, and implementation of this emergency action plan. The extent of owner implementation was defined through coordination of this plan with the County Sheriff and Emergency Management Agency (EMA) Director.

F. Periodic Review/Update

The owner shall review/update this EAP annually. Review/update by a qualified professional engineer will be accomplished as required by the dam's operating permit, but no less than every five years.

G. Approval

By my signature, I acknowledge that I, or my representative, have reviewed this plan and agree to the tasks and responsibilities assigned herein for my department and/or agency.

Robert J Mulch
Signature Date 02/15/07
OWNER, KOOTENAI DEVELOPMENT IMPOUNDMENT DAM

Daryl R. Anderson
Signature Date 02072007
LINCOLN COUNTY SHERIFF'S ~~DEPARTMENT~~ office

Marc Miller
Signature Date 1-29-07
EMERGENCY MANAGEMENT AGENCY

II. NOTIFICATION PROCEDURES

A. Imminent or Actual Failure

If KOOTENAI IMPOUNDMENT DAM IS FAILING, TWO THINGS MUST BE DONE IMMEDIATELY:

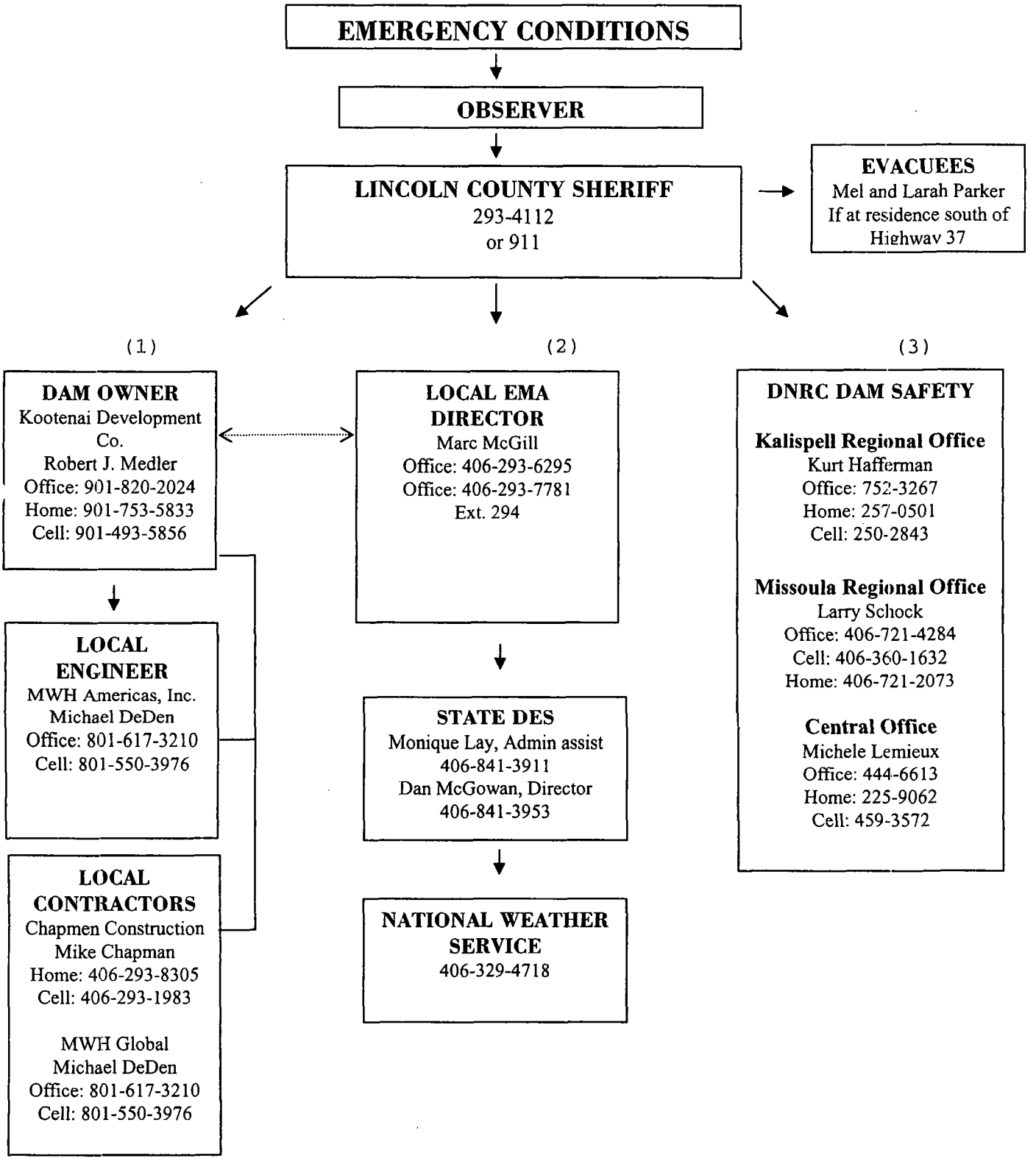
(1) Residents in the hazard area downstream from the dam must be warned according to the county warning plan, and initiated as shown in Figure 1, and

(2) Any steps that might save the dam or reduce damage to the dam or hazard area downstream should be taken. (Refer to the map in Appendix B to determine the areas that are likely to be inundated if the dam fails).

As dam owner, it is your responsibility to:

1. Call the Sheriff's Dispatch Center (911 or 293-4112) and the Emergency management Agency (293-6295), if they have not already been notified. Be sure to say, "This is an emergency." They will call other authorities and the media and begin the warning plan.
2. Notify Mel Parker at 293-9705, at this time the only residence below the dam, of the immediate danger and that should be evacuated.
3. Warn anyone in immediate danger to evacuate to safety. This includes someone on the dam, directly below the dam, or boating on the reservoir, or downstream evacuees, if so directed by the sheriff.
4. Contact the Disaster and Emergency Services staff at least once every hour. They may request your assistance in evacuating residents.
5. If all means of communication are lost:
   a. Try to find out why
   b. Get someone else to try to reestablish communications. If these means fail, take care of immediate problems and send someone to get to another radio or telephone that works.

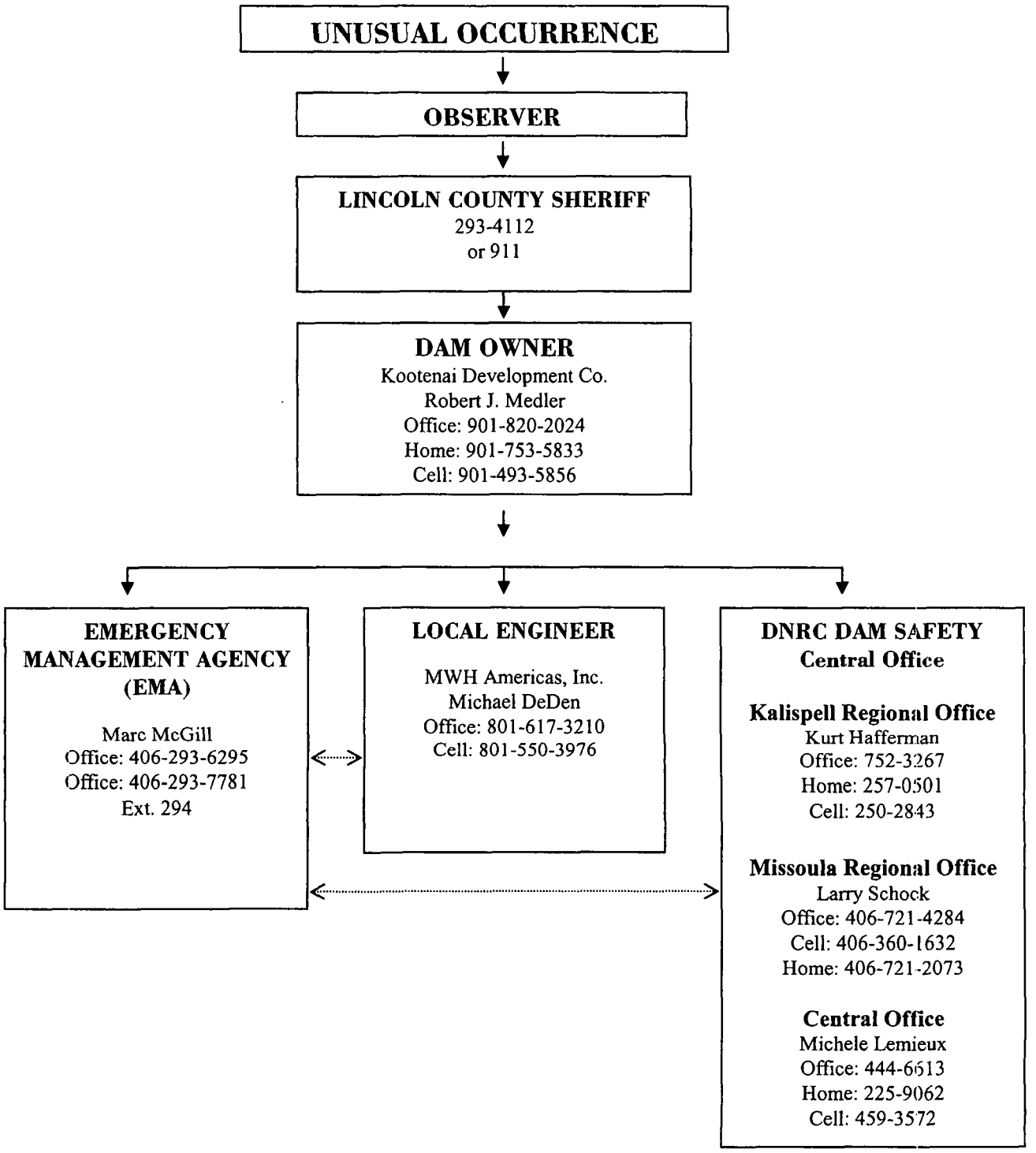
FIGURE 1
KOOTENAI DEVELOPMENT IMPOUNDMENT DAM
ACTUAL OR IMMINENT FAILURE
"NOTIFICATION FLOW CHART"



B. Potentially Hazardous Situation

A potentially hazardous situation is an event or condition not normally encountered in the routine operation of the dam and reservoir. Among the unusual occurrences that may affect the dam are dam embankment problems (see section B.2.), failure of the spillway or outlet works, heavy precipitation or rapid spring snow melt, landslides, earthquakes, erosion, theft, vandalism, acts of sabotage, and serious accidents. These occurrences may endanger the dam, the public, or the downstream valley and may necessitate a temporary or permanent revision of the dam's operating procedures. Help in these situations can be obtained by notifying those people shown in Figure 2.

FIGURE 2
KOOTENAI DEVELOPMENT IMPOUNDMENT DAM
POTENTIALLY HAZARDOUS SITUATION
"NOTIFICATION FLOW CHART"



1. If the dam owner discovers an unusual condition of the dam embankment that could threaten the structure:
   a. Complete the Dam Incident Report Form in Appendix D.
   b. Have a qualified engineer inspect the dam as soon as possible to determine whether emergency action is necessary.
   c. Notify the county Emergency Management Agency Director (293-6295) of the potential problem.
   d. Contact the Dam Safety Program (444- 6613) of the Department of Natural Resources and Conservation (DNRC).

2. Among the conditions the dam owner should watch for are:
   a. Overtopping of the dam by flood waters
   b. Loss of material from the dam crest due to storm wave erosion
   c. Slides on either the upstream or downstream slope of the embankment as evidenced by
      1. Sloughing
      2. Cracking
      3. Bulging
      4. Scarping
   d. Erosional flows through, beneath, or around the embankment as evidenced by
      1. Excessive seepage
      2. Discoloration of the seepage
      3. Boils on the downstream side
      4. Sinkholes
      5. Changes in the flow from drains
   e. Failure of outlets or spillways due to clogging or erosion
   f. Movement of the dam on its foundation as evidenced by
      1. Misalignment
      2. Settlement
      3. Cracking

3. Before calling either an engineer or DNRC to report a problem, the dam owner shall use the form in Appendix D to ensure sufficient information is provided for the engineer to analyze the problems. After talking to the engineer, it may be helpful to document the condition of the dam by making a sketch on the form in Appendix D, showing the extent of the problem. Revise the sketch periodically if the problem develops further. Section III includes further guidelines for courses of action to take mitigate the effect of many problems.

C. <u>Posting of the Notification Flowchart and Distribution of the EAP.</u>
The Lincoln County Sheriff's Office and the Lincoln County Emergency Management Services Director have copies of this plan.

III. MITIGATION ACTIONS

Besides normal monitoring of the dam's condition, which is done at least monthly, the owner will provide continuous monitoring and inspection during and after extreme events such as storms and earthquakes. Information on the magnitude of an earthquake or storm can be obtained from the DNRC Dam Safety Program (444- 6613). Actions are suggested below to mitigate problems that may develop, but those actions should never be continued at the risk of injury or at the expense of lessening efforts related to evacuation. Monitoring should identify any of the following potential problems.

A. Potential Problems and Immediate Response Actions

1. OVERTOPPING BY FLOOD WATERS
   - a. Open outlet to its maximum safe capacity.
   - b. Place sandbags along the crest to increase freeboard and force more water through the spillway and outlet.
   - c. Provide erosion-resistant protection to the downstream slope by placing plastic sheets or other materials over eroding areas.
   - d. Divert flood waters around the reservoir basin, if possible.
   - e. Create additional spillway capacity by making a controlled breach in a low embankment or dike section where the foundation materials are erosion-resistant.

2. LOSS OF FREEBOARD OR DAM CROSS SECTION DUE TO STORM WAVE EROSION
   - a. Place additional riprap or sandbags in damaged areas to prevent further embankment erosion.
   - b. Lower the water level to an elevation below the damaged area.

3. SLIDES IN THE UPSTREAM OR DOWNSTREAM SLOPE OF THE EMBANKMENT
   - a. Lower the water level at a rate and to an elevation considered safe, given the slope condition. If the outlet is damaged or blocked, pumping, siphoning, or a controlled breach may be required.
   - b. Stabilize slides on the downstream slope by
     1. weighting the toe area with additional soil, rock, or gravel, and then
     2. restoring lost freeboard by placing sandbags at the crest.

4. EROSIONAL FLOWS THROUGH THE EMBANKMENT, FOUNDATION, OR ABUTMENTS
   a. Plug the flow with whatever material is available (hay bales, bentonite, or plastic sheeting if the entrance to the leak is in the reservoir basin).
   b. Lower the water level until the flow decreases to a non-erosive velocity or stops.
   c. Place a protective sand-and-gravel filter or boil ring over the exit area to hold materials in place.

5. FAILURE OF APPURTENANT STRUCTURES SUCH AS OUTLETS OR SPILLWAYS
   a. Implement temporary measures to protect the damaged structure, such as closing an outlet or protecting a damaged spillway with riprap.
   b. Lower the water level to a safe elevation. If the outlet is inoperable, pumping, siphoning, or a controlled breach may be required.

6. MASS MOVEMENT OF THE DAM ON ITS FOUNDATION (SPREADING OR MASS SLIDING FAILURE)
   a. Immediately lower the water level until excessive movement stops.

7. EXCESSIVE SEEPAGE AND HIGH LEVEL SATURATION OF THE EMBANKMENT
   a. Lower the water to a safe level.
   b. Continue frequent monitoring for signs of slides, cracking or concentrated seepage.

8. SPILLWAY BACKCUTTING, THREATENING RESERVOIR EVACUATION
   a. Reduce the flow over the spillway by fully opening the main outlet.
   b. Provide temporary protection at the point of erosion by placing sandbags, riprap materials, or plastic sheets weighted with sandbags.
   c. When the inflow subsides, lower the water to a safe level.

9. EXCESSIVE SETTLEMENT OF THE EMBANKMENT
   a. Lower the water level by releasing it through the outlet pumping, siphoning, or a controlled breach.
   b. If necessary, restore freeboard, preferably by placing sandbags.

B. Emergency Supplies and Resources

Granite Concrete
525 Spencer Road
Libby, Montana
406-293-3777

Western Building Center
2131 Hwy 2 W
Libby, Montana
406-293-7755

Suitable soil for emergency repairs exist in the vicinity of the Impoundment Dam area, less than a ¼ mile downstream of the dam. A pit is located on the northwest side of the road with both silty clay soils that has a low permeability. There is also sand and gravel available in the pit. Ballast rock is available from the abandoned and reclaimed vermiculite mining site northeast of the dam.

C. Local Contractors and Engineers

Local Contractors:

Chapman Construction
Mike Chapman
Home: 406-293-8305
Cell: 406-293-1983

Engineer:

MWH Americas, Inc.
Michael DeDen
Office: 801-617-3210
Cell: 801-550-3976

APPENDICES

APPENDIX A

Technical Data for Kootenai Development Impoundment Dam

Max Reservoir Capacity to the Crest of the Dam: ..... 1,302 acre feet

Normal Reservoir Capacity Measured to the Emergency Spillway Crest: ..... 871 acre feet

Normal Water Depth Measured from the Streambed to the Crest of the Emergency Spillway 20 feet

Dam Height Measured From the Tailings Streambed to the Crest of the Dam: ..... 26 feet

Dam Height Measured From the Downstream Toe to the Crest of the Dam: ..... 135 feet

Dam Crest Width: ..... 40 feet

Dam Width at Base: ..... 400 feet

Length of Dam Crest: ..... 1,000 feet

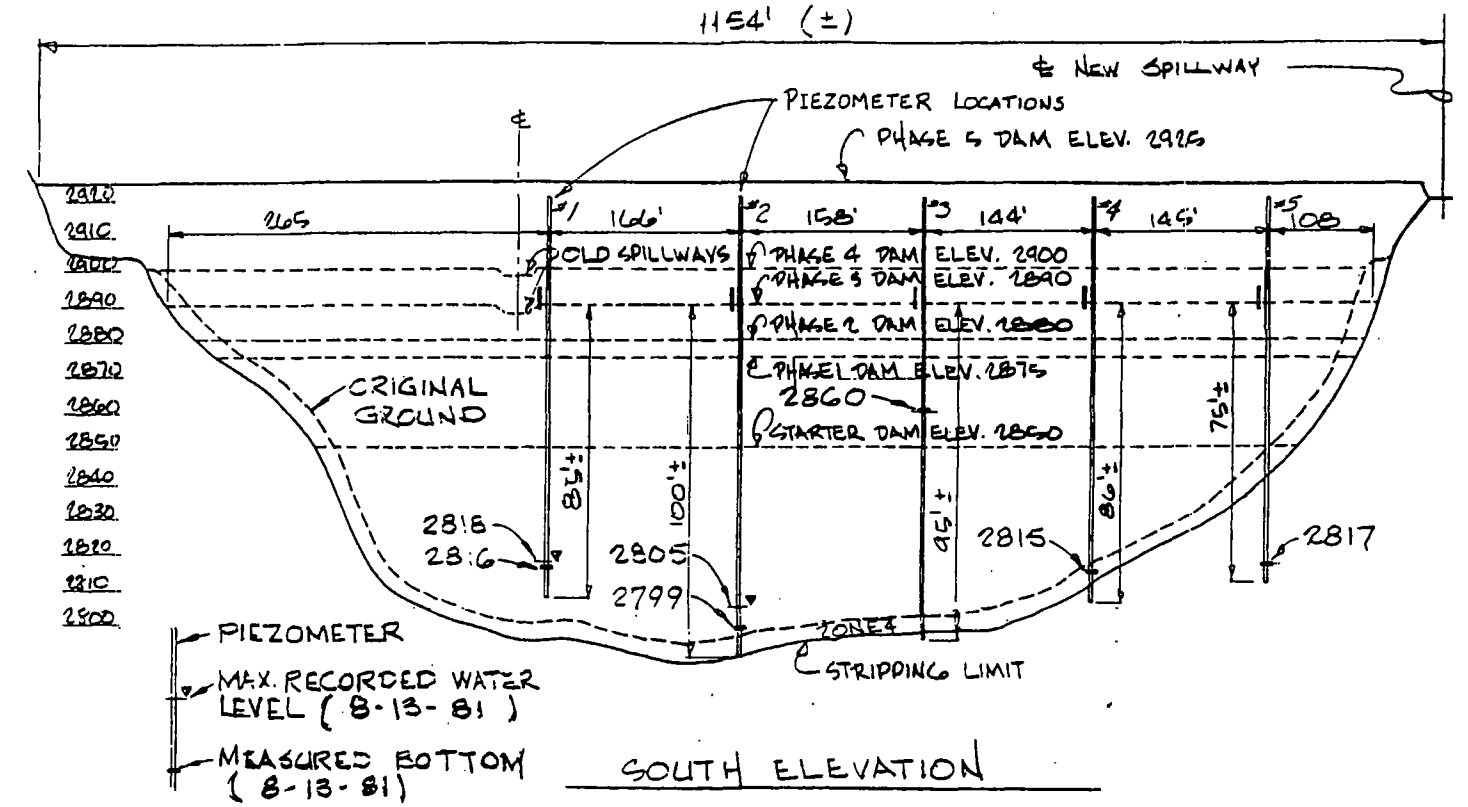
Outlet Capacity: ..... 731 cubic feet per second

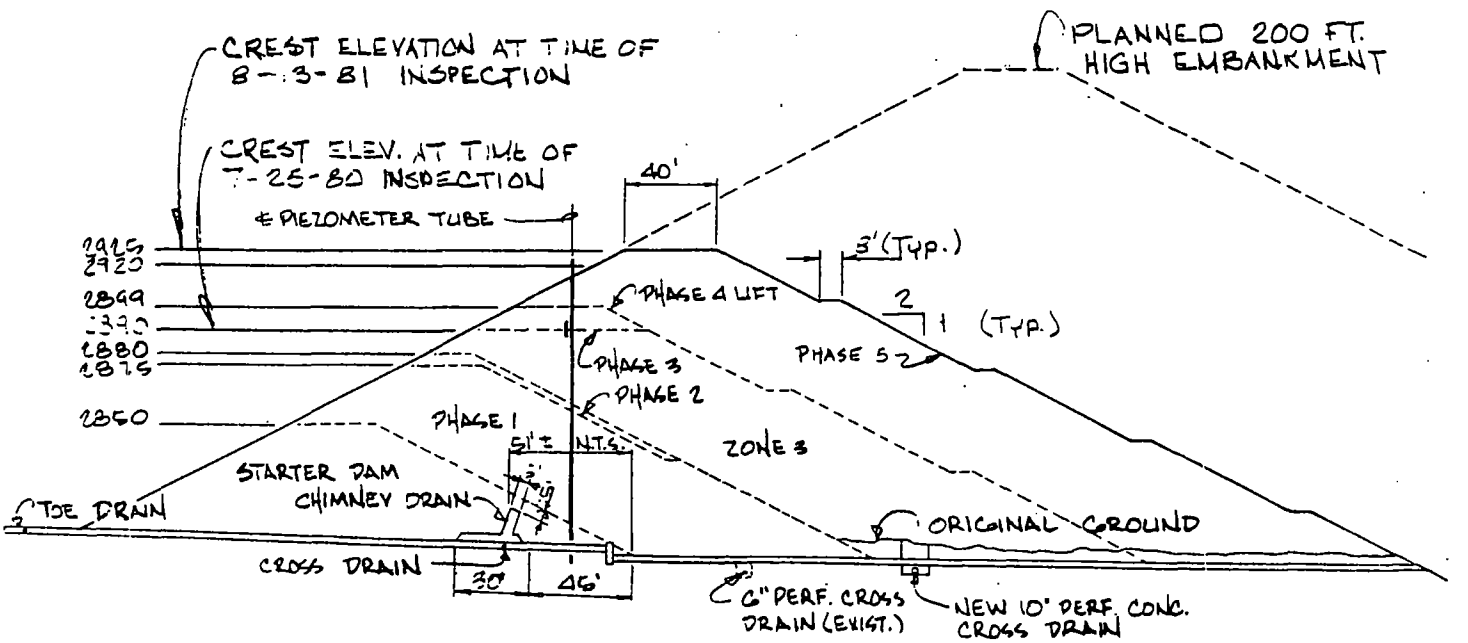
Emergency Spillway Capacity ..... 1,129 cubic feet per second

Date Constructed 1971

Slope of Upstream Face of Dam (Horizontal to Vertical) 2:1
Slope of Downstream Face of Dam (Horizontal to Vertical) 2:1

Figure B-2





ZONOLITE TAILINGS DAM

APPENDIX B
Inundation & Evacuation Maps

W. R. Grace / Rainy Creek Project
Tailings Impoundment

Legend

- Clear Weather Breach Flood Inundation Boundary
- Storm-Induced Breach Flood Inundation Boundary
- (2.60) Distance Downstream From Tailings Dam(miles)

Scale : 1"=1,500'

Mile 0.00 (Tailings Dam)

	Maximum Discharge (cfs)	Time to Max Discharge* (cfs)
Clear Weather Breach	7,200	0
Storm Induced Breach	16,900	0

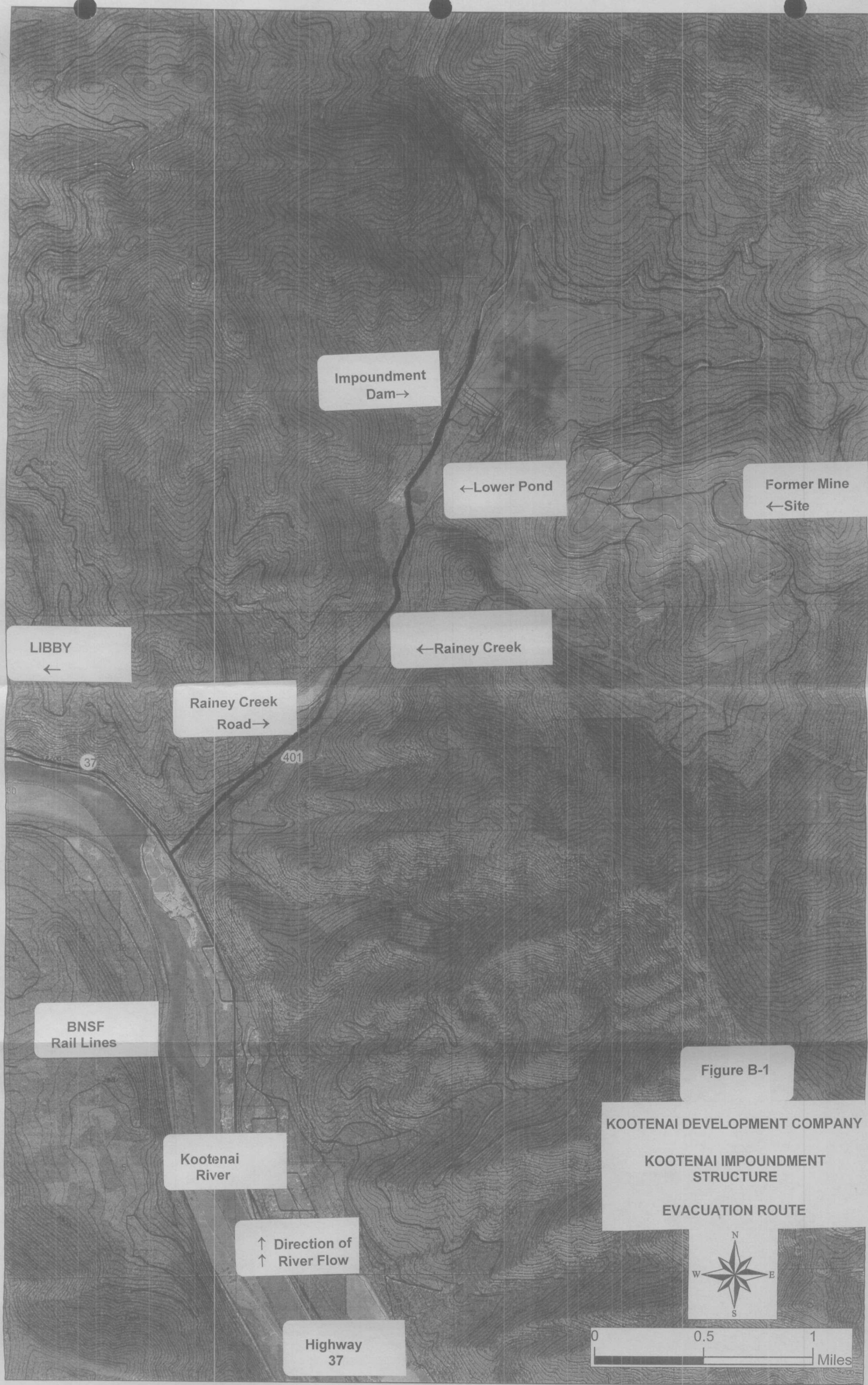
Mile 2.60 (Highway 37)

	Maximum Discharge (cfs)	Time to Max Discharge* (hr)	Max Stage (ft above streambed)
Clear Weather Breach	7,000	0.25	~ 8
Storm Induced Breach	16,300	0.20	~ 9

Beyond this point, the breach flood flows fall below the 100-year flood flow of the Kootenai River.

* Time to Maximum Discharge is measured from the time the peak flow occurs at the dam to the time that the peak flow reaches a location downstream.

Figure B-3


Impoundment Dam→
←Lower Pond
Former Mine ←Site
LIBBY ←
←Rainey Creek
Rainey Creek Road→
37
401
BNSF Rail Lines
Kootenai River
↑ Direction of ↑ River Flow
Highway 37
Figure B-1
KOOTENAI DEVELOPMENT COMPANY
KOOTENAI IMPOUNDMENT STRUCTURE
EVACUATION ROUTE
N
W
E
S
0
0.5
1
Miles

APPENDIX C
TELEPHONE DIRECTORY

A. Priority One

1. SHERIFF Lincoln County.....911 or 293-4112

2. EMERGENCY MANAGEMENT AGENCY Lincoln County

Marc McGill..... Office: 406-293-6295
..... Office: 406-293-7781 ext 294

State Disaster and Emergency Services (Helena)
..... 841-3911

3. EVACUEES (in upstream-to-downstream sequence)

Mel & Larah Parker, 293-9705

B. Priority Two

4. LOCAL ENGINEERS

MWH Americas, Inc.

Michael DeDen ..... Office: 801-617-3210
.....Cell: 801-550-3976

5. MONTANA DEPT. OF NATURAL RESOURCES AND CONSERVATION

Kurt Hafferman, Regional Manager:.....Office: 752-2288
.....Cell: 250-2843
.....Home: 257-0501

Michele Lemieux, Dam Safety Program Manager:.....Office: 444-6613
.....Cell: 406-459-3572
.....Home: 225-9062

Laurence Siroky, Water Operations Bureau Chief.....Office: 444-6816
.....Cell: 431-7475
..... Home: 442-2806

6. NATIONAL WEATHER SERVICE

Missoula 329-4718

Great Falls 453-9642

Billings 652-2314

7. KOOTENAI DEVELOPMENT IMPOUNDMENT DAM

Kootenai Development Co.
.....901-820-2024
.....901-820-2023

8. U.S. FOREST SERVICE, REGIONAL ENGINEER OFFICE 329-3176

APPENDIX D
DAM INCIDENT REPORT FORM

DATE: TIME:

NAME OF DAM:

STREAM NAME:

LOCATION:

COUNTY:

OBSERVER:

OBSERVER TELEPHONE:

NATURE OF PROBLEM:

LOCATION OF PROBLEM AREA (*Looking Downstream*):

EXTENT OF PROBLEM AREA:

FLOW QUANTITY AND COLOR:

WATER LEVEL IN RESERVOIR:

IS SITUATION WORSENING?

EMERGENCY STATUS:

CURRENT WEATHER CONDITIONS:

ADDITIONAL COMMENTS:

APPENDIX E

Emergency Action Plan Distribution List

PLAN HOLDER	NUMBER OF COPIES
Dam Owner, Kootenai Development Co., Inc.	2
Dam Tender, unknown	0
Lincoln County Sheriff	1
Local EMA Director	1
DNRC Dam Safety Program	1
DNRC Kalispell Regional Office	1
National Weather Service	1
Engineer	1

KOOTENAI DEVELOPMENT IMPOUNDMENT

STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURES

KOOTENAI DEVELOPMENT IMPOUNDMENT DAM
Aka, W. R. Grace Rainy Creek Tailings Dam

KOOTENAI DEVELOPMENT COMPANY
c/o Remedium Group, Inc.
6401 Poplar Ave., Suite 301
Memphis, TN 38119
901-820-2020

February 13, 2007

Prepared By

Remedium Group, Inc.
6401 Poplar Ave., Suite 301
Memphis, TN 38119

I. GENERAL INFORMATION

A. Purpose

This document provides guidance for the operation of the Kootenai Development Impoundment Dam located in Lincoln County, Montana. The Impoundment Dam, formerly known as the W. R. Grace Rainy Creek Tailings Dam, is classified as high hazard by the State of Montana hazard classification standards.

B. Responsibility

Mr. William Corcoran, President of Kootenai Development Company, has final authority and responsibility for the safety, operation, and maintenance of the Kootenai Development Impoundment Dam. Mr. Corcoran has delegated the responsibility for the safety, operation, and maintenance of this Impoundment Dam to Remedium Group, Inc., 6401 Poplar Ave., Suite 301, Memphis, TN 38119. The Remedium contacts are:

- R. J. Medler, Director of Remedium Group, Inc., and
- R. R. Marriam, Consultant for Remedium Group, Inc.

C. Special Considerations

The Kootenai Development Impoundment Dam is part of the Libby, Montana Superfund Site. Access to the dam is restricted and entry through the locked gate across the roadway requires approval from:

US EPA
EPA Information Center
501 Mineral Ave.
Libby, MT 59923
Telephone: 406-293-6194
Fax: 406-293-5668

Entry restrictions require that authorized visitors either stay within a chauffeured and pressurized vehicle, or (2) be suitably trained, medically monitored, and properly equipped with personal protection equipment if they intend to exit the transportation vehicle. There must be at least 2 people taking part in any trip beyond the locked gates. Arrangements must be made for the required documentation of vehicles and personnel when entering the restricted areas. In any event, clearance for entry can be arranged through:

CDM
Mr. Shawn Oliveira
Libby Asbestos Project Health & Safety Manager
Telephone: 406-293-8595 xt. 25
Cell: 406-293-1547

D. Attendance

The Impoundment Dam is unattended and the nearest operating personnel are in Libby, Montana.

E. Communication and Warning

There is no phone or radio at the Impoundment Dam.

F. Interaction With Others

Major maintenance and repair of the Impoundment Dam must be coordinated with the Department of Natural Resources and Conservation (DNRC).

G. Operating Log

No operating log is maintained for the Impoundment Dam. Normal stream flow from Rainy Creek and Fleetwood Creek as well as surface runoff are allowed to pass directly through the dam. A small pond of water at the upper end

of the impoundment exists all year. The level of this pond is dependent on the amount of water flowing in each of the streams and will fluctuate from year to year as well as from season to season. When sufficient runoff exists to raise the level of the pond to elevation 2,903, the flow will enter a constructed channel that will allow the water to pass through the dam structure and re-enter the natural streambed below the dam. A detailed description of the "Inflow Channel", "Flow Through Structure", and "Outflow Channel" are included in Section II of this document as well as in various appendices.

H. Public Health and Safety

In the interest of public safety and health, access to the Impoundment Dam is controlled by locked gates at both the top and bottom of the dam. Access onto the forestry road (Rainy Creek Road) servicing the dam is gated and requires special EPA permission for entry.

I. Distribution

This Standard Operating Procedure Manual has been distributed as shown on the following page.

STANDARD OPERATING PROCEDURES
DISTRIBUTION LIST

Mike Chapman
CHAPMAN CONSTRUCTION
P. O. Box 516
Libby, MT 59923

William Corcoran, President
KOOTENAI DEVELOPMENT COMPANY
7500 Grace Drive
Columbia, MD 21044

Michael DeDen
MWH AMERICAS
10619 So. Jordan Gateway, Suite 100
Salt Lake City, UT 84095

Kurt Hafferman
MONTANA DEPARTMENT OF NATURAL RESOURCES & CONSERVATION
KALISPELL REGIONAL OFFICE
109 Cooperative Way, Suite 110
Kalispell, MT 59901-2387

Michelle Lemieux
MONTANA DAM SAFETY PROGRAM
DEPARTMENT OF NATURAL RESOURCES & CONSERVATION
P. O. Box 201601
Helena, MT 59620-1601

Marc McGill, Director
EMERGENCY MANAGEMENT AGENCY
952 East Spruce
Libby, MT 59923

Robert Medler
REMEDIUM GROUP, INC.
6401 Poplar Ave., Suite 301
Memphis, TN 38119

STANDARD OPERATING PROCEDURES
DISTRIBUTION LIST

Sheriff
LINCOLN COUNTY MONTANA
512 California Avenue
Libby, MT 59923

Terry Voeller
MONTANA DEPARTMENT OF NATURAL RESOURCES &
CONSERVATION
P. O. Box 201601
Helena, MT 59620-1601

II. MECHANICAL AND STRUCTURAL

A. General Description

The Impoundment Dam is a 135-foot high, 1,000-foot long, earthen embankment constructed of homogeneous material. The dam's primary function was to impound –65 mesh mine waste material from the W. R. Grace vermiculite mine and mill process facility. This material flowed into the impoundment in a slurry form. The solids were deposited behind the structure with the decanted water being used over and over in the vermiculite extraction process. The foundation of the dam has a number of eight-inch perforated pipes used to collect ground water and transport it to the downstream side of the dam. This water was also used in the process facilities. The volume of discharged water is approximately 300 gallons per minute (gpm).

Following the plant closure in September 1990, W. R. Grace contracted with Harding Lawson Associates of San Francisco to perform a study of pertinent literature and reports, explore subsurface conditions of the tailings, embankment, and foundation materials, and to perform engineering analyses to develop conclusions and, as appropriate, recommendations regarding the following:

1. Seismic design criteria
2. Geotechnical characteristics of the tailings material
3. Liquefaction potential of the tailings and foundation soil based on current standards of practice
4. Long-term static and dynamic stability of the dam
5. Adequacy of the existing internal system of the dam

The Harding Lawson report is on file with both the Department of State Lands (DSL) and the Department of Natural Resources and Conservation (DNRC).

Inflow to the impoundment is uncontrolled. On the east side of the dam, the outflow consists of a rip-rapped open channel constructed in the tailings material beginning at an elevation of 2,903 feet to the dam face at an elevation of 2,900 feet where an 8 foot wide by 4 foot high concrete box culvert extends 168 feet through the body of the dam. From the downstream side of the dam, the outflow enters a 965 foot long open concrete channel that is 8 foot wide by 3 foot high and empties into a 20 foot deep rip-rapped plunge pool. From the plunge pool, the outflow combines with the water flowing from the drainage structure (toe drains) beneath the dam. An emergency overflow structure is constructed on the west side of the dam opposite from the main outflow structure. The combination of the outflow structure and the emergency overflow structure is designed to safely pass .66 Probable Maximum Flood (PMF). The PMF for the Rainy Creek drainage has been calculated at 11,676 cfs.

Other pertinent data are listed below:

KOOTENAI DEVELOPMENT IMPOUNDMENT DAM

Location	NW ¼ of Section 22, Township 31N, Range 30W, Lincoln County, Montana
Watersheds	Rainy Creek and Fleetwood Creek
Owner	Kootenai Development Company c/o Remedium Group, Inc. 6401 Poplar Ave., Suite 301 Memphis, TN 38119

Purpose	Mine Tailings Impoundment
Year Constructed	1971 with additional lifts in 1975, 1977, and 1980
Structure	Earth fill dam
Spillway	Concrete culvert through the dam into an open concrete channel along with open rip-rapped emergency channel
Dam Classification	High Hazard

KEY ELEVATIONS

Top of Dam	2,926 feet (151')
Bottom of Box Culvert	2,897 feet (122')
Top of Emergency Spillway	2,922 feet (147')
Confluence with Toe Drains	2,775 feet (0')

MAIN DAM DIMENSIONS

Structural Height	135 feet
Crest Length	1,000 feet
Crest Breadth	40 feet
Face Slopes (Hor.:Ver.)	2:1 upstream side 2:1 downstream side

OUTLET DIMENSIONS

Concrete Box Culvert	4' high by 8' wide by 168' long
Concrete Open Channel	3' high by 8' wide by 965' long
Capacity	731 cfs

EMERGENCY SPILLWAY

Width	35 feet
Length	380 feet
Capacity	1.129 cfs

RESERVOIR

Surface Area	75 acres maximum pool 15 acres minimum pool
Storage at:	
Top of Dam	1,302 acre-feet
Emergency Spillway Crest	1,013 acre-feet

B. Control Structure Operation

The control structure for passage of the design event allows for the free flow of water through an 8 foot wide by 4 foot high concrete box culvert constructed through the dam at an elevation of 2,900'. The length of the culvert is 168 feet with a 2.4% grade. From the box culvert, the flow is into an open 8 foot wide by 3 foot high concrete channel. This open channel is 607 feet long at a grade of 5% followed by another 358 feet at a 17.5% grade.

C. Emergency Spillway Operation

This spillway is an uncontrolled open rip-rapped channel.

D. Filling and Release Schedule

Filling of the reservoir will begin each spring and will continue until the completion of the spring runoff. Filling of the reservoir is uncontrolled. The level to which it fills is dependent only upon the amount of runoff.

Release of water from the reservoir will only occur when the level of the water reaches elevation 2,903 feet and will continue unimpeded until the level falls below elevation 2,903 feet.

E. Flood Operations

At the earliest possible indication of abnormally heavy rainfall in the Rainy Creek basin, the Kootenai person responsible for the maintenance of the Kootenai Impoundment Dam should station himself at the dam. If it appears likely that significant outflow from the emergency spillway will occur, a warning should be given to any downstream residents to prepare for evacuation as outlined in the Emergency Action Plan.

III. INSTRUMENTATION

A. General Description

Instrumentation consists of eleven (11) slotted-pipe piezometers. Four of the piezometers are located on the upstream crest; two are on the downstream crest; four are midway of the downstream face; and one is located at the toe of the downstream face. These piezometers are all drilled at least 20 feet into the foundation material. Three of the piezometers are placed to detect leakage of water from the box culvert structure. The remaining holes are positioned to monitor the level of subsurface water which flows out the existing toe drains.

B. Records

Piezometer readings are to be taken monthly and recorded in the log book.

C. Abnormal Readings

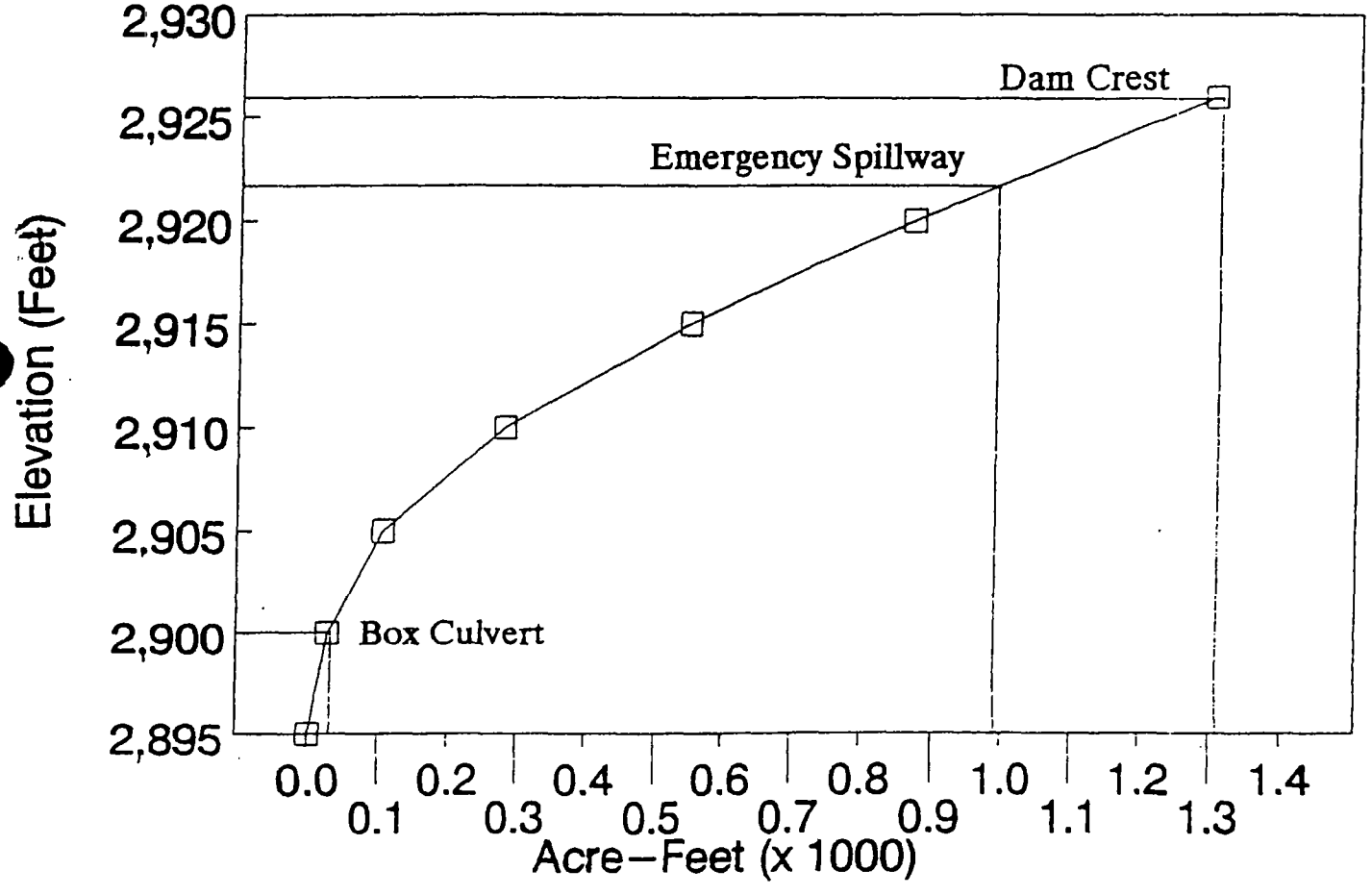
A sudden rise in piezometer levels may indicate a leakage from the concrete box culvert or a blockage in one or more of the toe drains and should be investigated immediately.

IV. RESERVOIR OPERATIONS

A. Elevation vs. Capacity Curve

The storage capacity of the reservoir at varying elevations of the water surface is given in Figure 1 below.

Figure 1 Elevation vs. Capacity



B. Design Flood Routing

The inflow design flood and outlet design flood defined by flow rate (cfs) versus time (hours) is given in Figure 2 below. The peak inflow equals .5 PMF (5,838 cfs) and the peak outflow equals 1,860 cfs.

Figure 2 Outflow for Design Flood

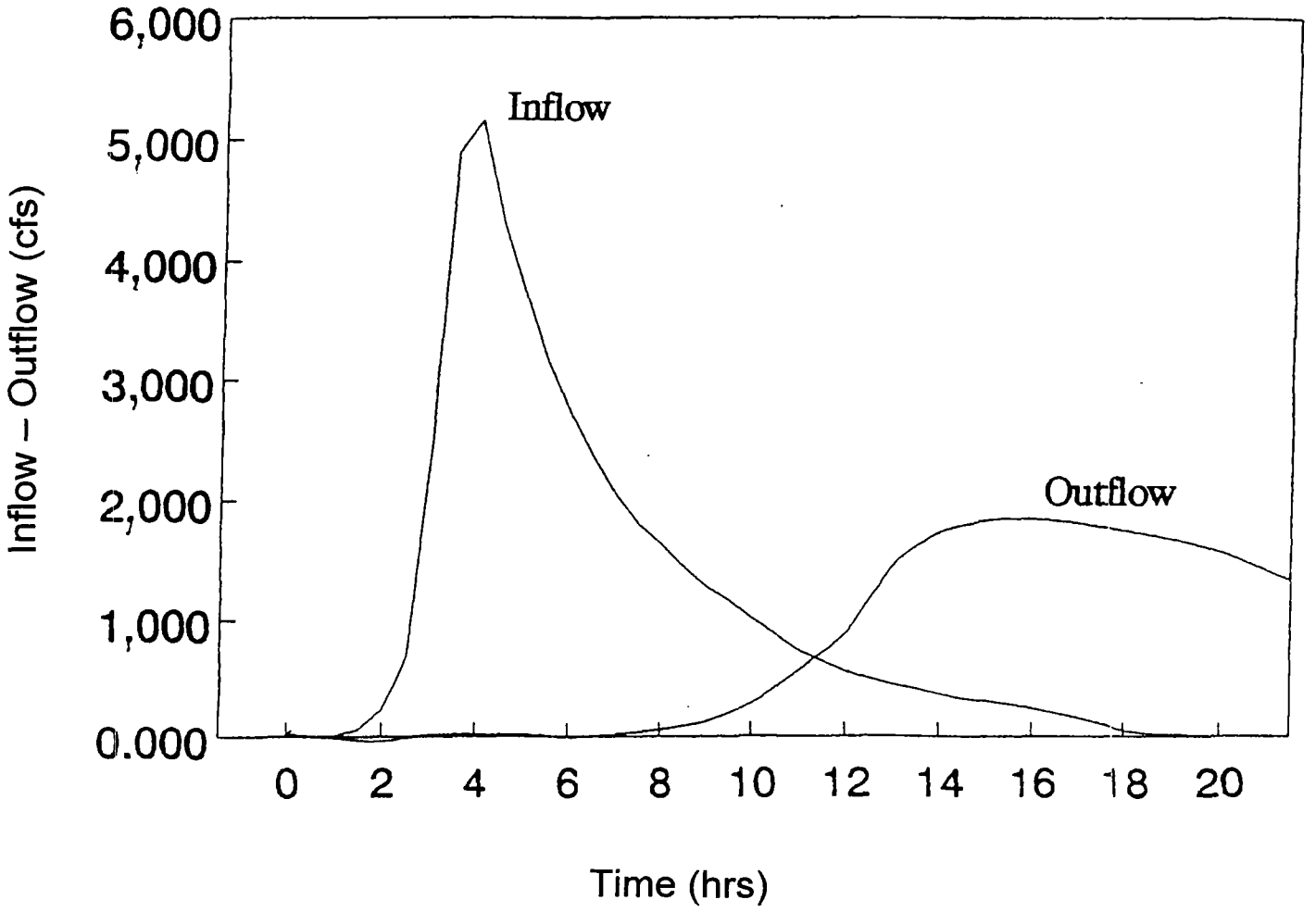
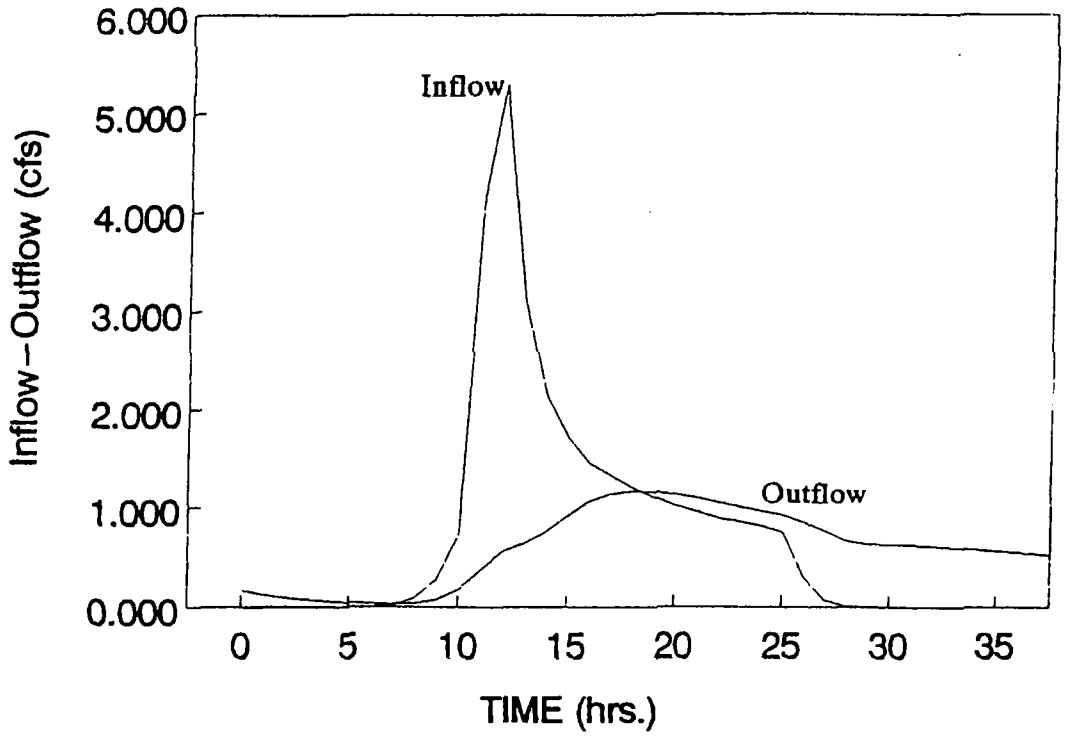


Figure 2 Outflow for Design Flood



Time	cfs In	cfs Out	Time	cfs In	cfs Out	Time	cfs In	cfs Out
0	0	168	13	3119.45	631.41	26	308.32	845.31
1	7.02	128.29	14	2144.02	753.09	27	69.38	756.66
2	7.98	99.28	15	1720.79	914.53	28	19.02	666.12
3	8	77.29	16	1461.09	1066.92	29	9.32	636.04
4	8	60.6	17	1336.29	1142.14	30	8.22	630.29
5	8	49.7	18	1211.28	1170.51	31		624.59
6	8.02	41.8	19	1106.35	1164.31	32		609.31
7	17.69	36.09	20	1021.25	1136.05	33		593.43
8	96.92	40.39	21	958.65	1100.1	34		577.97
9	280.42	75.26	22	895.21	1055.2	35		562.91
10	730.32	178.36	23	858.02	1011.63			
11	4077.77	379.35	24	812.36	966.95			
12	5284.49	557.13	25	744.34	922.8			

The outflow rating curve defined by the reservoir elevation (feet) versus the discharge (cfs) is given in Figure 3 below. The peak reservoir elevation equals 2,926 feet and the peak outflow equals 1,860 feet.

Figure 3 Outflow Discharge

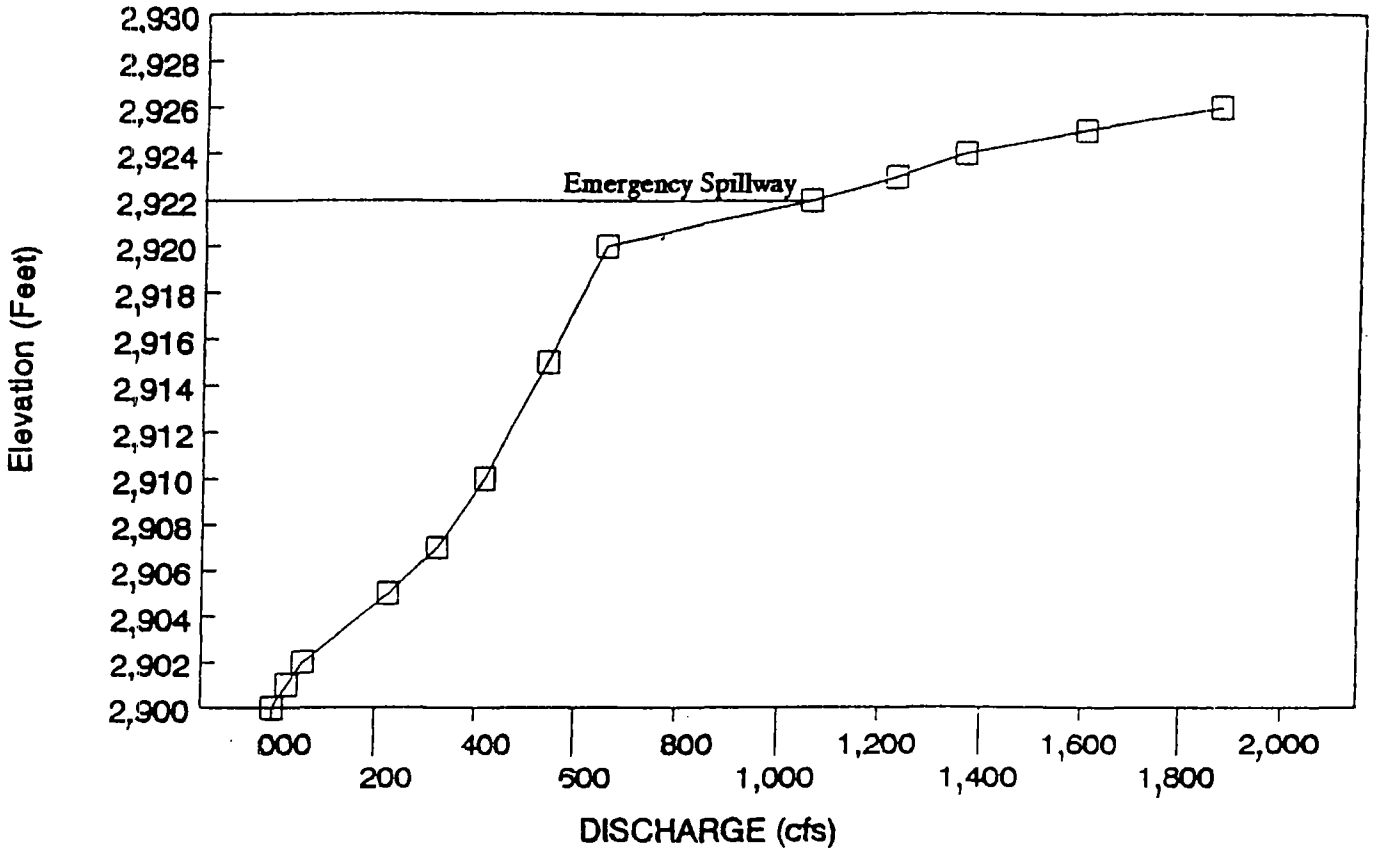
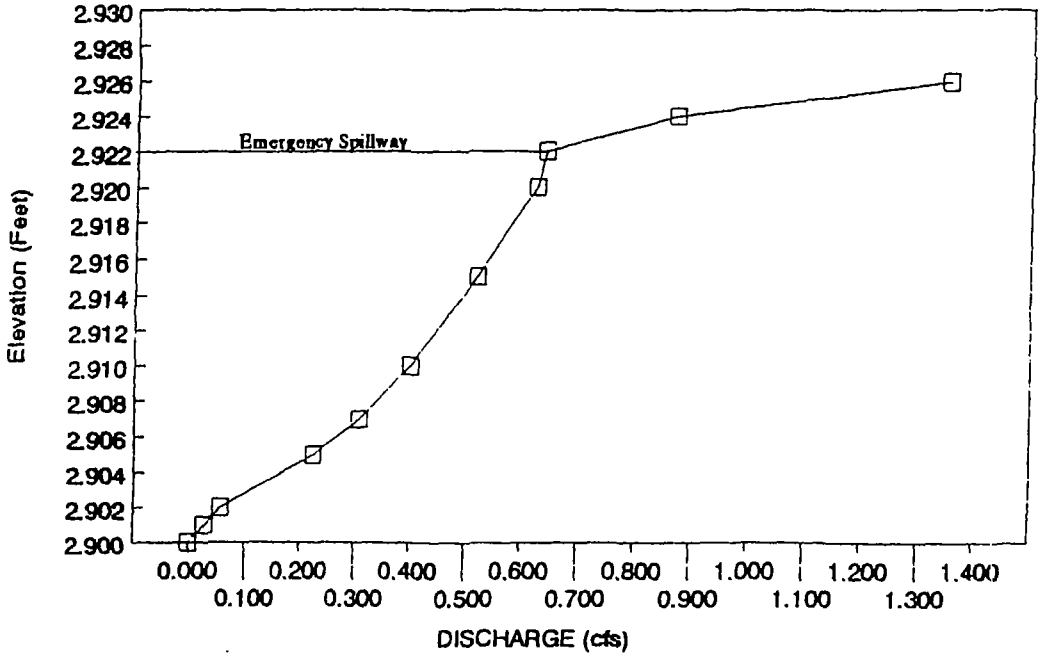


Figure 3 Outflow Discharge



cfs Out	Elevation
0	2900
28	2901
56	2902
224	2905
308	2907
400	2910
520	2915
624	2920
640	2922
872	2924
1352	2926

B. Supporting Documents and References

Appendix A contains drawings of the inflow, flow through, and outflow structures.

STANDARD OPERATING PROCEDURES

APPENDIX A

PROJECT MAP

LEGEND

PIPELINE

WATER

ROAD

50' CONTOUR LINE

10' CONTOUR LINE

SCALE 0 100 200 300 400 500 600 700 800 900 1000

REFERENCE	REVISION

Plate 1. Plan view of project area

KOOTENAI DEVELOPMENT IMPOUNDMENT

MAINTENANCE PROCEDURES

MAINTENANCE PROCEDURES

KOOTENAI DEVELOPMENT IMPOUNDMENT DAM
Aka, W. R. Grace Rainy Creek Tailings Dam

KOOTENAI DEVELOPMENT COMPANY
c/o Remedium Group, Inc.
6401 Poplar Ave., Suite 301
Memphis, TN 38119
901-820-2020

March 1, 2007

Prepared By

Remedium Group, Inc.
6401 Poplar Ave., Suite 301
Memphis, TN 38119

I. GENERAL INFORMATION

This document provides guidance for the maintenance of the Kootenai Development Co. Impoundment Dam. The Impoundment Dam, located in Lincoln County, Montana, was formerly owned by W. R. Grace & Co. and described as the Rainy Creek Tailings Dam in their maintenance procedures program submitted January 1993. Maintenance and routine inspection responsibilities described in this section will be performed by personnel under the direction of Remedium Group, Inc. (designee by Kootenai Development Group directors).

The following conditions are critical, call for immediate repair or maintenance, and should trigger a response as outlined in the Emergency Action Plan:

a. Erosion, slope failure, or other conditions that are endangering the integrity of the dam
b. Piping and internal erosion as evidenced by increasingly cloudy seepage or other symptoms
c. Outflow channel blockage or restriction
d. Excessive or rapidly increasing seepage appearing anywhere near the dam site.

Critical items such as these should be detected during routine inspection, which is covered in Part III of this plan. Other items require maintenance either routinely or at the earliest possible date. These are covered in detail in the following section, Part II.

II. SCHEDULE OF MAINTENANCE

Whenever the yearly inspection or more frequent informal inspections identify items requiring maintenance, they should be noted in the Operations Log and added to the work schedule. The following maintenance items should be completed as soon as possible after identification.

a. Repair of erosion gullies
b. Repair of deteriorated concrete
c. Maintenance of riprap cover

In addition, continued maintenance should be performed for the following items:

a. Removal of debris from approach to box culvert
b. Removal of debris from inside of box culvert
c. Removal of debris from bottom of outflow channel
d. Removal of debris from emergency spillway
e. Removal of debris from in front of tow drains

A. Embankment Maintenance

a. Fill erosion gullies with properly compacted and cohesive material. Seed or riprap the surface.
b. Remove rodents and fill burrows with a slurry of soil, cement, and water.
c. Fertilize and maintain grass cover. Ensure adequate slope protection.
d. Remove brush, bushes, and trees from the embankment and from within 25 feet of the groins and 50 feet of the toe. Remove tree roots, compact and seed damaged areas.
e. Add or replace riprap to the upstream slope.

B. Outlet Maintenance

a. Repair deteriorated concrete in the box culvert and outflow channels.
b. Remove debris from exit channel annually.
c. Add or replace riprap to the upstream and downstream area around the box culvert.
d. Add or replace riprap to the emergency spillway.

C. Miscellaneous Maintenance

a. Repair or replace damaged or missing warning signs.
b. Replace broken locks on any access gates.

III. INSPECTIONS

Inspection of the Kootenai Development Impoundment Dam will be scheduled and completed:

a. Yearly for routine operation and maintenance inspections.
b. Periodically (not to exceed five years) for comprehensive inspections and engineering reviews.
c. After critical events including severe rain or windstorms, earthquakes, or periods of extremely high storage.

A. Yearly Inspection

Kootenai Development Co., the dam owner, will assure the standard operating and maintenance procedures and inspections are performed. Emergency procedures as outlined in the Emergency Action Plan will be reviewed and updated annually.

B. Periodic Investigation

A qualified professional engineer will conduct the periodic investigation and engineering review within the period set in the operating permit (not to exceed every five years). Investigations will be documented in Appendix A, including photographs (as necessary), and documentation with regard to actions taken to correct recommendations resulting from these inspections. Within 90 days of the inspection, a copy of the inspection report will be presented to the Dam Safety Program of the Department of Natural Resources and Conservation together with a statement of intent to correct any deficient or unsafe items noted in the report and a time schedule to remedy the items. This investigation will include the items and recommendations called for in the Montana Dam Safety Rules.

C. Critical Event Inspection

A qualified professional engineer will conduct an inspection after each critical event that may adversely impact the dam's performance. Documentation of this inspection will be maintained on forms found in Appendix A.

APPENDIX A

KOOTENAI DEVELOPMENT IMPOUNDMENT
ROUTINE INSPECTION REPORT

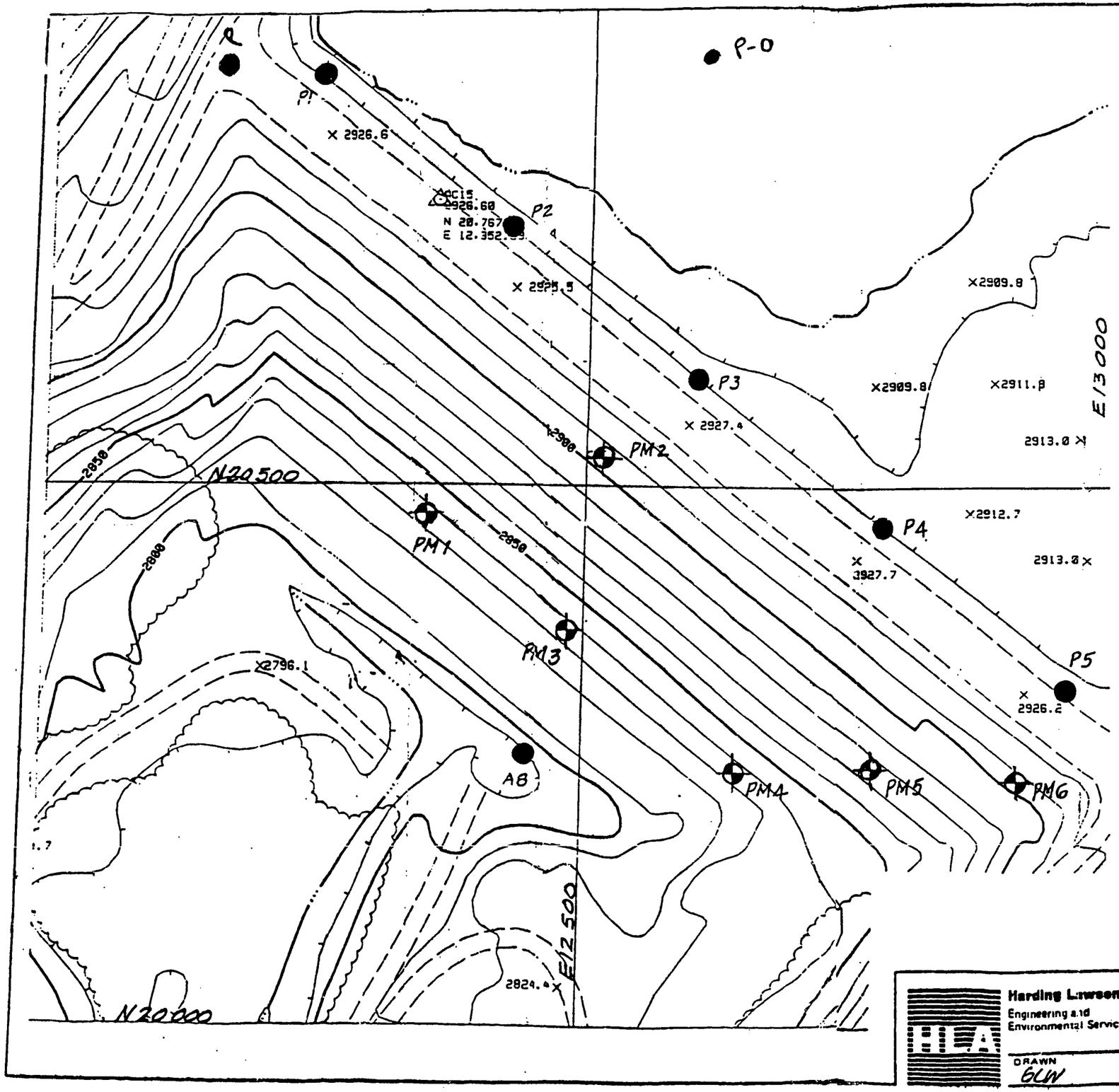
Dam Inspector(s): _____ **Inspection Date:** _____

Reservoir Elevation: _____ **Weather Conditions:** _____

PIEZOMETER READINGS (See Attached Drawing for Locations)							
Piezo-meter ID	Depth Measured	Water Level	Dry	Piezo-meter ID	Depth Measured	Water Level	Dry
P0				PM1			
P				PM2			
P1				PM3			
P2				PM4			
P3				PM5			
P4				PM6			
P5				A-8			

FINDINGS				
Inlet Box Culvert				
Outlet Box Culvert				
Emergency Spillway Inlet				
Plunge Pool				
Toe Drains				
Dam Observations				
Areas of Concern				
Photos Taken		Yes		No

Signatures _____ _____



Explanation

P1 – Location of previously installed piezometer

PM1 – Recommend location of additional piezometer for monitoring downslope face of embankment

Reference: Topographic map prepared by Walker + Associates, Inc., untitled, undated.

Scale: 1" = 100'

Harding Lawson Associates
Engineering and Environmental Services

Recommended Piezometer Locations
W. R. Grace Dam
Rainy Creek, Montana

PLATE 1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
GLW	10674-055	GLW	9/92	

KOOTENAI DEVELOPMENT IMPOUNDMENT

Annual Earthen Dam Owner's Observation Report

Purpose: 1)Identify Maintenance Needs 2.) Record Observations on dam condition

Dam Name: _____

Dam Observer: _____ **Observation Date:** _____

Reservoir Elevation: _____ **Weather Conditions:** _____

Area to be Examined	Observations	Recommended Action	Date to be completed
Embankment Crest			
surface cracks			
animal burrows			
low areas			
vegetation			
ruts			
other			
Downstream Slope			
wet areas/seepage			
slides/depressions etc.			
animal burrows			
erosion			
vegetation			
other			
Upstream Slope			
vegetation			
erosion,slides, sinkholes etc.			
slope protection			
Spillway			
Chute condition			
Sidewall conditions			
Spillway entrance			
Spillway toe			
other			

KOOTENAI DEVELOPMENT IMPOUNDMENT
DAM PERIODIC INVESTIGATION

Dam Name: _____

Dam Observer: _____ Observation Date: _____

Reservoir Elevation: _____ Weather Conditions: _____

AREA INSPECTED	EMBANKMENT			CHECK ACTION NEEDED		
	ITEM NO.	CONDITION	OBSERVATIONS	MONITOR	INVESTI-GATE	REPAIR
CREST	1	SURFACE CRACKING				
	2	CAVE IN, ANIMAL BURROW				
	3	LOW AREA(S)				
	4	HORIZONTAL ALIGNMENT				
	5	RUTS AND/OR PUDDLES				
	6	VEGETATION CONDITION				
	7					
	8					
UPSTREAM SLOPE	9	SLIDE, SLOUGH, SCARP				
	10	SLOPE PROTECTION				
	11	SINKHOLE, ANIMAL BURROW				
	12	EMB-ABUT CONTACT				
	13	EROSION				
	14	VEGETATION CONDITION				
	15					
	16					

ADDITIONAL COMMENTS: REFER TO ITEM NO., IF APPLICABLE

KOOTENAI DEVELOPMENT IMPOUNDMENT
DAM PERIODIC INVESTIGATION

Dam Name: _____

Dam Observer: _____ Observation Date: _____

Reservoir Elevation: _____ Weather Conditions: _____

AREA INSPECTED	EMBANKMENT (CONT'D)			CHECK ACTION NEEDED		
	ITEM NO.	CONDITION	OBSERVATIONS	MONITOR	INVESTI-GATE	REPAIR
DOWNSTREAM SLOPE	17	WET AREA(S) (NO FLOW)				
	18	SEEPAGE				
	19	SLIDE, SLOUGH, SCARP				
	20	EMB-ABUT CONTACT				
	21	CAVE IN, ANIMAL BURROW				
	22	EROSION				
	23	UNUSUAL MOVEMENT				
	24	VEGETATION CONDITION				
	25	REMOVAL OF TREES/SHRUBS (a)				
	26					
INSTRUMENTATION	27	PIEZOMETERS/OBSERV. WELLS				
	28	STAFF GAUGE AND RECORDER				
	29	WEIRS				
	30	SURVEY MONUMENTS				
	31	DRAIN'S				
	32	FREQUENCY READINGS				
	33	LOCATION OF RECORDS				
	34					

ADDITIONAL COMMENTS: REFER TO ITEM NO., IF APPLICABLE

(a) Trunk diameters larger than 2 inches.

KOOTENAI DEVELOPMENT IMPOUNDMENT
DAM PERIODIC INVESTIGATION

Dam Name: _____

Dam Observer: _____ **Observation Date:** _____

Reservoir Elevation: _____ **Weather Conditions:** _____

AREA INSPECTED	DOWNSTREAM AREA & MISCELLANEOUS			CHECK ACTION NEEDED		
	ITEM NO.	CONDITION	OBSERVATIONS	MONITOR	INVESTI-GATE	REPAIR
DOWNSTREAM AREA	35	ABUTMENT LEAKAGE				
	36	FOUNDATION SEEPAGE				
	37	SLIDE, SLOUGH, SCARP				
	38	DRAINAGE SYSTEM				
	39					
	40					
	41	HAZARD DESCRIPTION				
	42	DATE OF LAST UPDATE OF EAP				
MISCELLANEOUS	43	RESERVOIR SLOPES				
	44	ACCESS ROADS				
	45	SECURITY DEVICES				
	46					
	47					
	48					
	49					
	50					

ADDITIONAL COMMENTS: REFER TO ITEM NO., IF APPLICABLE

KOOTENAI DEVELOPMENT IMPOUNDMENT
DAM PERIODIC INVESTIGATION

Dam Name: _____

Dam Observer: _____ **Observation Date:** _____

Reservoir Elevation: _____ ***Weather Conditions:*** _____

AREA INSPECTED	SPILLWAYS			CHECK ACTION NEEDED		
	ITEM NO.	CONDITION	OBSERVATIONS	MONITOR	INVESTI-GATE	REPAIR
ERODIBLE CHANNEL	51	SLIDE, SLOUGH, SCARP				
	52	EROSION				
	53	VEGETATION CONDITION				
	54	DEBRIS				
	55					
	56					
NON-ERODIBLE CHANNEL	57	SIDEWALLS				
	58	CHANNEL FLOOR				
	59	UNUSUAL MOVEMENT				
	60	APPROACH AREA				
	61	WEIR OR CONTROL				
	62	DISCHARGE AREA				
	63	CRACK WIDTH-BOX CULVERT (a)				
	64					
DROP INLET	65	INTAKE STRUCTURE				
	66	TRASH RACK				
	67	STILLING BASIN				
	68					
	69					

ADDITIONAL COMMENTS: REFER TO ITEM NO., IF APPLICABLE

(a) Bottom of box culvert through dam.

KOOTENAI DEVELOPMENT IMPOUNDMENT

EPA

PRE-ENTRY

INSTRUCTIONS

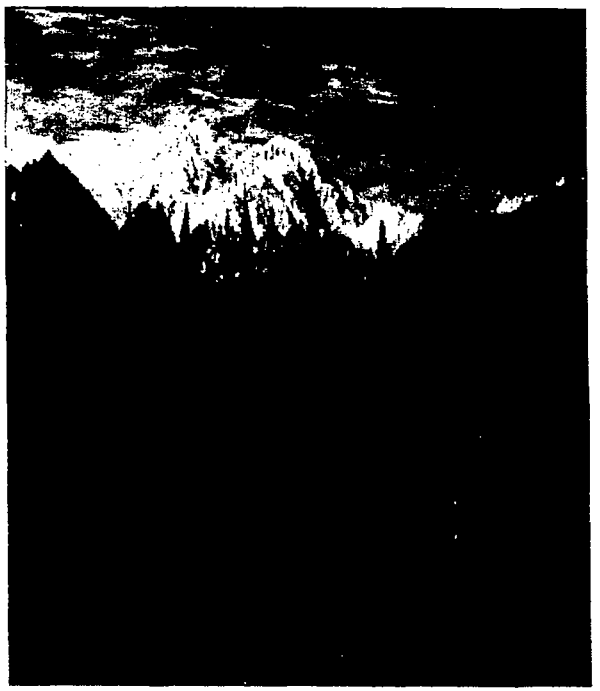
KOOTENAI DEVELOPMENT IMPOUNDMENT

PRE-ENTRY INSTRUCTIONS

The Kootenai Development Impoundment is located on a US EPA Superfund Site and special entry rules are in effect. Permission must be secured from the local US EPA office to enter through the locked gate that blocks County Road/Forestry Service Road #401 near the intersection of US Highway 37. Special arrangements can be made to drive (in a suitably pressurized vehicle) onto the restricted property without required training or personal protection equipment. In this situation, the passengers must stay in the vehicle with the windows and doors closed. For those instances where the individual expects to get out of the vehicle and perform various functions or activities, specific training and personal protection equipment are required. These requirements may be found in the attached EPA Libby Asbestos Remediation Project – Pre-Entry Orientation. Please be aware that decontamination of individuals and vehicles will be required upon leaving the site.

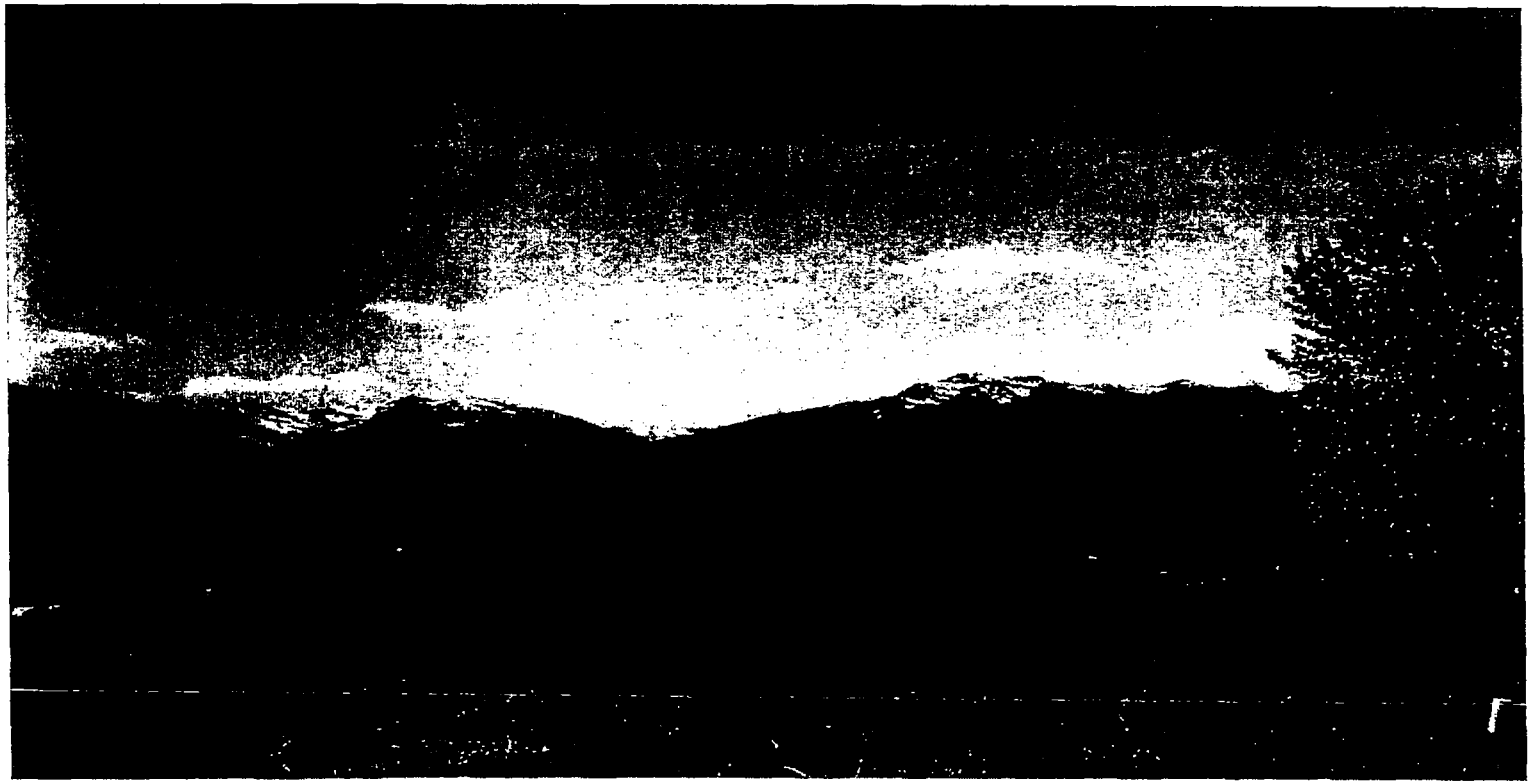
W. R. Grace & Co. insists that Grace employees or Grace contractors who enter this restricted area must be accompanied by at least one other person. There will be no instances when a lone employee or contractor employee enters this site. Furthermore, all applicable safety rules and regulations must be followed without exception.

EPA - Libby Asbestos Remediation Project Pre- Entry Orientation



Welcome

A View from the Mine Site

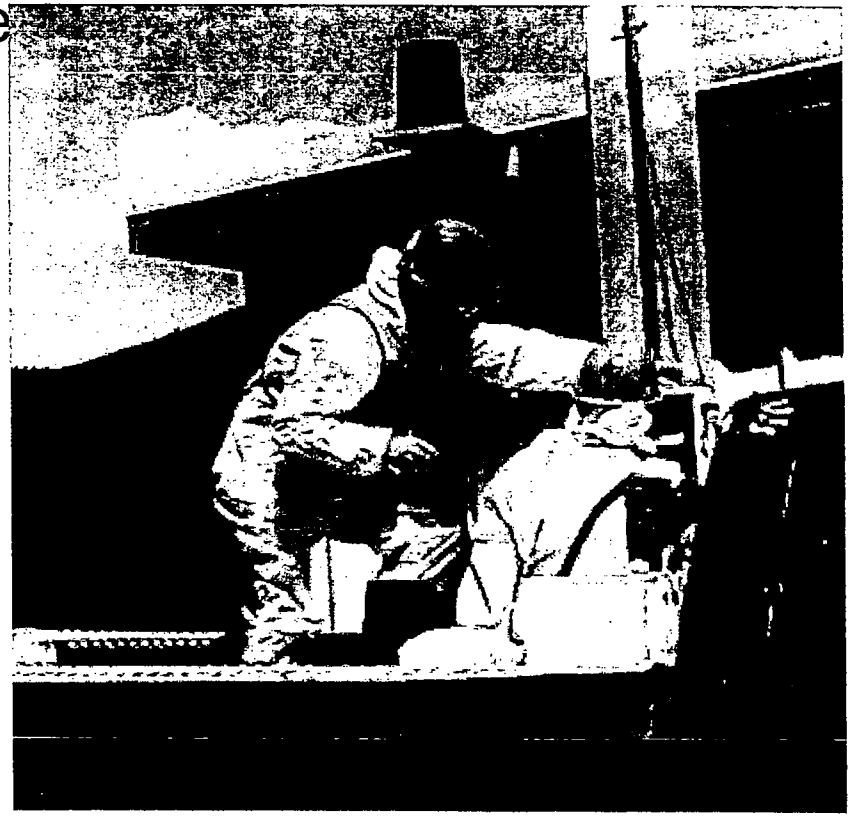


Our Goals

- A productive field-season
- A healthy workforce
- A safe work environment
- A successful remediation

Prior to Entry

- Check in at Site Office
- Hard Hat
- Orange Vest
- Steel Toed Boots



Safety Certifications

- 40 Hour Hazwoper Certification
- Current Hazwoper Certification (8 hour)
- Medical Release
- Respirator Fit Test

REMEDIATION LOCATIONS

- Former Screening Plant
- Former Export Plant
- Public Schools
- Residential Properties

Asbestos – Routes of Exposure

- Exposure Route is Inhalation
- Asbestos can also irritate eyes
- No eating, smoking or application of cosmetics in the work zones.

Asbestos Exposure Limits

- .1fiber per cubic centimeter – 8 hour time weighted average
- 1.0 fiber per cubic centimeter – 30 minute excursion
- NIOSH Analytical Method 7400

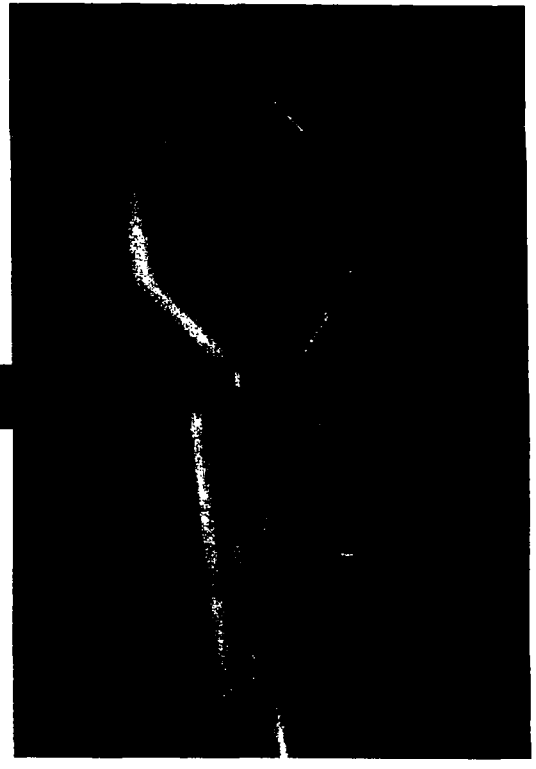
The Effects of Overexposure

- Asbestosis – Nonmalignant scarring of the lungs
- Bronchogenic Carcinoma – Localized malignancy in the linings of the lungs
- Mesothelioma – Diffuse malignancy of the lining of the chest (pleural) cavity

Site Activities - Former Screening Plant

- Heavy Equipment Operations
- Hauling Trucks
- Decontamination
- Air/Soil Sampling
- Traffic Control

General Protocols



- Obey all safety postings
- Wear assigned protective equipment
- Follow decontamination procedures
- Report any hazards promptly to the site safety officer

Personal Protective Equipment

- Hard Hat
- Safety Glasses with Side Shields
- Orange Vest
- Steel-Toed Work Boots
- Personal Flotation Devices (< 6 ft from water)

Work Zone Entry

- Check Radio
- Remove Street Clothes
- Don Tyvek Suit
- Select Gloves
- Don Respirator
- Enter Controlled Zone
- Don Boots
- Check Radio

Work Zone Exit

- Exit
- Remove Boots
- Remove Tyvek Suit
- Remove Gloves
- Remove Cartridges
- Shower with Respirator
- Remove Respirator
- Don Street Clothes

Emergency Response

• Spill/Fire/Police	• 911
• Lincoln County Sheriff	• 293-4112
• Highway Patrol	• 1(800)525-5555
• Forest Service	• 293-6511
• Bonneville Power	• 293-4816
• Plumb Creek Timber	• 293-6204
• National Response Ctr	• 1(800)424-8802

KOOTENAI DEVELOPMENT IMPOUNDMENT

INSPECTION LOG

ROUTINE/ANNUAL INSPECTIONS

KOOTENAI DEVELOPMENT IMPOUNDMENT

ROUTINE/ANNUAL INSPECTIONS

The Kootenai Development Impoundment and Dam was constructed to contain the mineral fines (-65 mesh) generated from the vermiculite processing facilities at the former Zonolite/Grace mine. These fines have filled about 70% – 80% of the impoundment volume behind the dam. The combined Rainy Creek and Fleetwood Creek now flows on the surface of the impoundment and discharges from a specially constructed box culvert installed in and through the dam. There is no control method or machinery to adjust or regulate the flow in or out of the impoundment. Whatever water enters the impoundment (creek water or mine runoff) discharges through the box culvert, seeps into the impoundment soil, or is evaporated. Routine inspections (monthly, depending on weather conditions and annually, required) consist of measuring the water level in the Piezometers installed in the dam, checking the inlet and outlet of the box culvert for obstructions, and examining the toe drains. It also involves the examination of the dam for any erosion or excessive vegetation growth. The inspections not only note and record problem areas with the dam, but also establish a timetable for corrective action.

Results of prior inspections are included in this section.

KOOTENAI DEVELOPMENT IMPOUNDMENT
ROUTINE INSPECTION REPORT

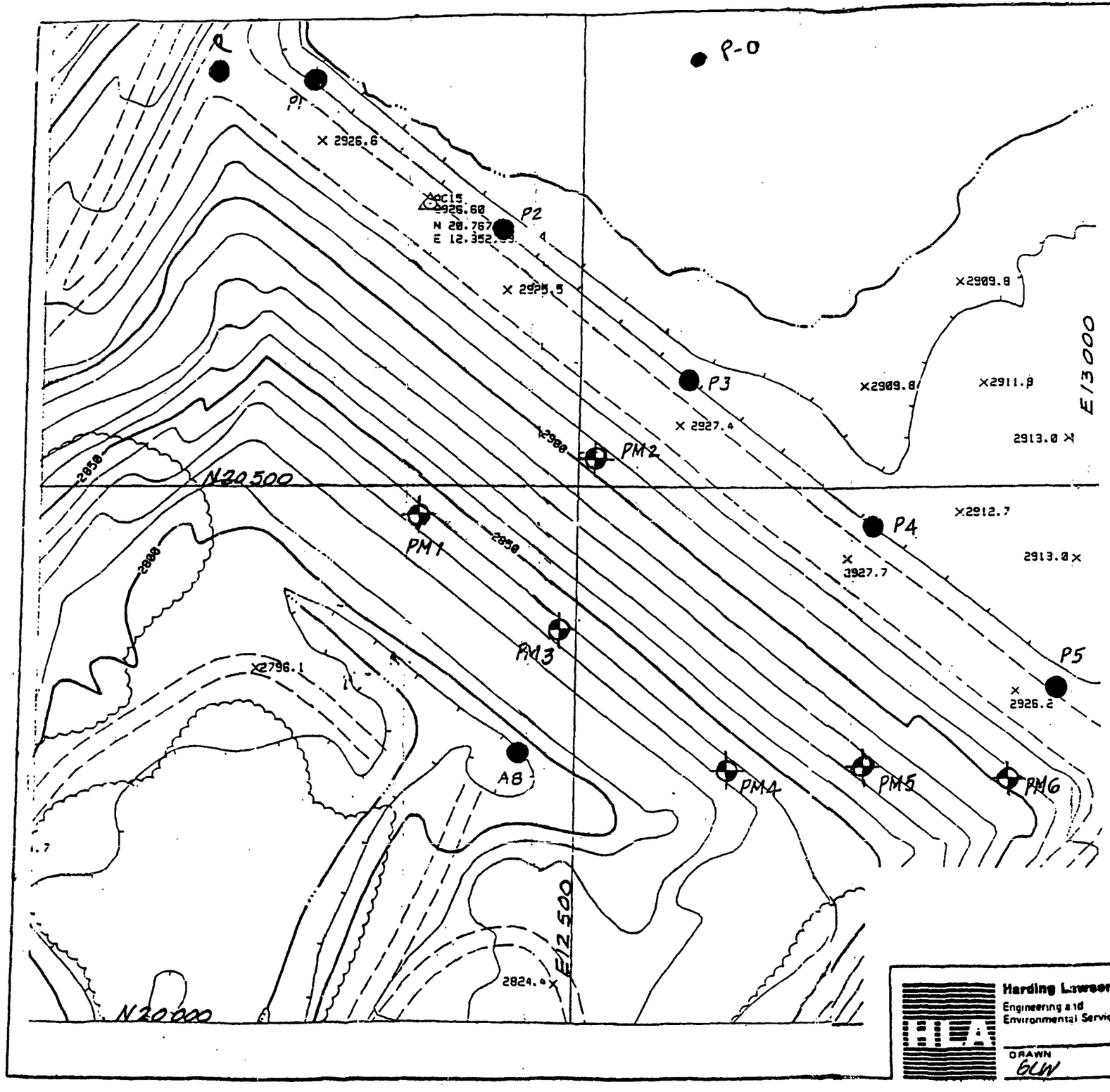
Dam Inspector(s):_____ Inspection Date: _____

Reservoir Elevation: _____ Weather Conditions:_____

PIEZOMETER READINGS (See Attached Drawing for Locations)							
Piezo-meter ID	Depth Measured	Water Level	Dry	Piezo-meter ID	Depth Measured	Water Level	Dry
P0				PM1			
P				PM2			
P1				PM3			
P2				PM4			
P3				PM5			
P4				PM6			
P5				A-8			

FINDINGS				
Inlet Box Culvert				
Outlet Box Culvert				
Emergency Spillway Inlet				
Plunge Pool				
Toe Drains				
Dam Observations				
Areas of Concern				
Photos Taken		Yes		No

Signatures _____ _____



Explanation

P1 - Location of previously installed piezometer

PM1 - Recommend location of additional piezometer for monitoring downslope face of embankment

Reference: Topographic map prepared by Walker + Associates, Inc., untitled, undated.

Scale: 1" = 100'

Harding Lawson Associates
Engineering and Environmental Services

Recommended Piezometer Locations
W. R. Grace Dam
Rainy Creek, Montana

PLATE 1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
GLW	10674-055	GLW	9/92	

000472

KOOTENAI DEVELOPMENT IMPOUNDMENT

Annual Earthen Dam Owner's Observation Report

Purpose: 1)Identify Maintenance Needs 2.) Record Observations on dam condition

Dam Name: _____

Dam Observer: _____ **Observation Date:** _____

Reservoir Elevation: _____ **Weather Conditions:** _____

Area to be Examined	Observations	Recommended Action	Date to be completed
Embankment Crest			
surface cracks			
animal burrows			
low areas			
vegetation			
ruts			
other			
Downstream Slope			
wet areas/seepage			
slides/depressions etc.			
animal burrows			
erosion			
vegetation			
other			
Upstream Slope			
vegetation			
erosion,slides, sinkholes etc.			
slope protection			
Spillway			
Chute condition			
Sidewall conditions			
Spillway entrance			
Spillway toe			
other			

6-28-02

Dam inspection and Monitoring Well Water Levels

PO	82'
P	102.2' Dry
P1	92.63'
P2	91.22'
P3	60.48' Dry
P4	86.79'
P5	96.34'
PM1	48.82'
PM2	89.63'
PM3	51.62' Dry
PM4	41.02' Dry
PM5	49.83' Dry
PM6	65.52' Dry
A8	2.62'

Channel and Dam is in good condition with no erosion evident

Inlet channel and drainage ditches were cleaned of growth and debris removed

July 31, 2002

Dam Inspection & Water Levels

PO	1.85'	PM2	98.87'
P	102.2' Dry	PM3	51.59' Dry
P1	123.63' Dry	PM4	41.02' Dry
P2	111.77'	PM5	49.84' Dry
P3	60.5' Dry	A8	5.46'
P4	105.83' Dry	PM6	65.52' Dry
P5	104.17' Dry		
PM1	50.54'		

Dam is in good condition.

Aug. 29, 02

Dam Insp. & Water Levels.

PO	2.05' Dry	PM1	50.96'
P	102.2' Dry	PM2	99.64'
P1	103.78' Dry	PM3	51.55' Dry
P2	117.82'	PM4	41.02' Dry
P3	60.5' Dry	PM5	49.84' Dry
P4	106.0' Dry	PM6	65.52' Dry
P5	104.19' Dry	A8	6.76'

9-30-02

Dam Inspection and Monitory Well Water Levels

PO	2.05' Dry	PM1	51.55'
P	102.2' Dry	PM2	103.12'
P1	103.78' Dry	PM3	51.59 Dry
P2	119.25'	PM4	41.02' Dry
P3	60.5' Dry	PM5	49.84' Dry
P4	106.0' Dry	PM6	65.52' Dry
P5	104.17' Dry	A8	7.22'

Channel and Dam are in good condition
Cleaned Lower channels and Drain Pipe outlets
of growth.

10-18-02

Dam Inspection:

PO	2.05' Dry	PM1	51.74'
P	102.2' Dry	PM 2	103.36'
P1	103.78' Dry	PM3	51.59 Dry
P2	119.34'	PM4	41.02' Dry
P3	60.5' Dry	PM5	49.84' Dry
P4	106.0' Dry	PM6	65.52' Dry
P5	104.17' Dry	A8	7.77'

Dam Inspection

PO	2.05 Dry	PM1	51.92
P	102.2 Dry	PM2	103.74
P1	103.78 Dry	PM3	51.59' Dry
P2	119.68	PM4	41.02 Dry
P3	60.5 Dry	PM5	49.84 Dry
P4	~~104~~ 106.0 Dry	PM6	65.52 Dry
P5	104.17 Dry	A8	7.62

Dam is in good cond.

Dec 5, 2002

Dam Inspect. Water Levels

PO	2.05' Dry	PM1	52.68'
P	102.2' Dry	PM2	103.88'
P1	103.78' Dry	PM3	51.59' Dry
P2	119.76'	PM4	41.02' Dry
P3	60.5' Dry	PM5	49.84' Dry
P4	106.0' Dry	PM6	65.52' Dry
P5	104.17' Dry	A8	7.68'

January

No Levels Taken due to weather

Feb 24, ~~02~~ 03

PO	2.05' Dry	PM1	52.74'
P	102.2' Dry	PM2	103.90'
P1	103.78' Dry	PM3	51.59' Dry
P2	119.82'	PM4	41.02' Dry
P3	60.5' Dry	PM5	49.84' Dry
P4	106.0' Dry	PM6	65.62' Dry
P5	104.17' Dry	A8	7.62'

Dam is in good condition

3-28-03

Dam inspect

PO	1.42'	PM 1	51.99'
P	102.2' Dry	PM 2	102.11'
P1	103.78' Dry	PM 3	51.59' Dry
P2	119.69'	PM 4	41.02' Dry
P3	60.5' Dry	PM 5	49.84' Dry
P4	106.0' Dry	PM 6	65.52' Dry
P5	104.12' Dry	A 8	6.21'

Dam is in good condition

April 28, 2003

PO	Not Taken due to surface water,		
P	102.2' Dry	PM 2	97.48'
P1	101.62'	PM 3	51.60' Dry
P2	112.74'	PM 4	41.02' Dry
P3	60.5' Dry	PM 5	49.84' Dry
P4	104.28'	PM 6	65.52' Dry
P5	104.17' Dry	A 8	3.41'
PM 1	50.02'		

Dam condition is good.

May 30, 2003

Dam inspection and Well Monitoring

PO	Unable to obtain due to surface water		
P P1	102.2' Dry	PM 2	94.67'
P1 P2	99.42'	PM 3	51.61' Dry
P2 P	103.62'	PM 4	40.94' Dry
P3	60.48' Dry	PM 5	49.82' Dry
P4	94.62'	PM 6	65.52' Dry
P5	103.47'	A 6	4.62'
PM 1	49.67'		

Channel and Dam are in good condition

6-14-03

Dam inspection and Well Monitoring

PO	.98'	PM 1	50.62'
P	102.2' Dry	PM 2	101.23'
P1	103.78' Dry	PM 3	51.60' Dry
P2	101.34'	PM 4	41.01' Dry
P3	60.5' Dry	PM 5	49.84' Dry
P4	103.23'	PM 6	65.52' Dry
P5	103.76'	A 8	6.22'

7-29-03

Dam inspection

PO	1.6'	PM 1	51.58'
P	102.2' Dry	PM 2	103.38'
P1	103.78' Dry	PM 3	51.62' Dry
P2	119.16'	PM 4	41.0' Dry
P3	60.48' Dry	PM 5	49.82' Dry
P4	105.87' Dry	PM 6	65.52' Dry
P5	104.17' Dry	A 8	7.39'

Channel & Dam are in good condition
Channel lower channel and drain pipes
of growth and obstructions

8-26-03

Dam inspection and Well Levels

PO	2.05' Dry	PM 1	51.62'
P	102.2' Dry	PM 2	103.42'
P1	103.78' Dry	PM 3	51.59' Dry
P2	119.42'	PM 4	41.02' Dry
P3	60.5' Dry	PM 5	49.84' Dry
P4	105.87' Dry	PM 6	65.52' Dry
P5	104.17'	A 8	7.68'

Sept. 23 2003

Dam inspection

PO	2.05 Dry	PM1	51.76
P	102.2 Dry	PM2	103.49
P1	103.78 Dry	PM3	51.60 Dry
P2	119.51	PM4	41.02 Dry
P3	60.5 Dry	PM5	49.84 Dry
P4	105.87 Dry	PM6	65.52 Dry
P5	104.17	A8	7.70'

Oct. 21, 2003

P-	102.2 Dry	PM 1 -	51.84
PO -	2.05 Dry	2 -	103.54
1 -	103.78 Dry	3 -	51.60 Dry
2 -	119.32	4 -	41.02 Dry
3 -	60.5 Dry	5 -	49.84 Dry
4 -	105.87 Dry	6 -	65.52 Dry
5 -	104.18 Dry	A8 -	7.94

The Dam is in good condition with no visible erosion. Drain channels are clear.

Nov. 19, 2003

PO	2.05 Dry	PM 1 -	51.84
P	102.2 Dry	2 -	103.59
P 1	103.78 Dry	3 -	51.60 Dry
2	119.72	4 -	41.02 Dry
3	60.5 Dry	5 -	49.84 Dry
4	105.87 Dry	A8 -	7.90
5	104.18 Dry	6 -	65.52 Dry

12-10-04 Dam Inspection

PO -	~~2.05~~ RC 2.05 Dry	PM-1 -	51.86 ~~Dry~~
P -	~~2.05~~ 102.2 Dry	2 -	103.54
P1 -	103.78 Dry	3 -	51.60 Dry
2 -	119.44	4 -	41.02 Dry
3 -	60.5 Dry	5 -	49.84 Dry
4 -	105.87 Dry	6 -	65.52 Dry
5 -	104.16 Dry	A8 -	7.81

Inspection not done in Jan. due to weather.

Feb 12, 2004 Dam Inspection

PO -	2.05' Dry	PM 1 -	51.82'
P -	102.2' Dry	2 -	103.52'
P1 -	103.78' Dry	3 -	51.60' Dry
2 -	119.45'	4 -	41.02' Dry
3 -	60.5' Dry	5 -	49.84' Dry
4 -	105.87 Dry	6 -	65.52' Dry
5 -	104.16 Dry	A8 -	7.80'

March 17, 2004 Dam Insp.

PO -	1.72' Surface Moist.	PM 1 -	51.68'
P -	102.2' Dry	2 -	101.46'
P1 -	103.78' Dry	3 -	51.60' Dry
2 -	~~119.86~~' ~~119.74~~ RC 119.74'	4 -	41.02' Dry
3 -	60.5' Dry	5 -	49.84' Dry
4 -	105.26'	6 -	65.52' Dry
5 -	104.17' Dry	A8 -	6.83'

Dam is in good cond. - Some growth starting in drain channels

April 13, 2004

Dam Inspection

PO -

P -

P1 -

P2 - Note: Unable to do in

P3 - April due to access problems

P4 -

P5 -

PM-1

PM2

PM3

PM4

PM5

PM6

A8

April 13, 2004

Personnel: Randy Cummings
David Cosgriff

P.P.E: Nitrile Gloves

Soil samples were taken from transformer area adjacent to the Flyaway Pump House. This area is on the app. N. side of the swamp berm on the E. end of the building.

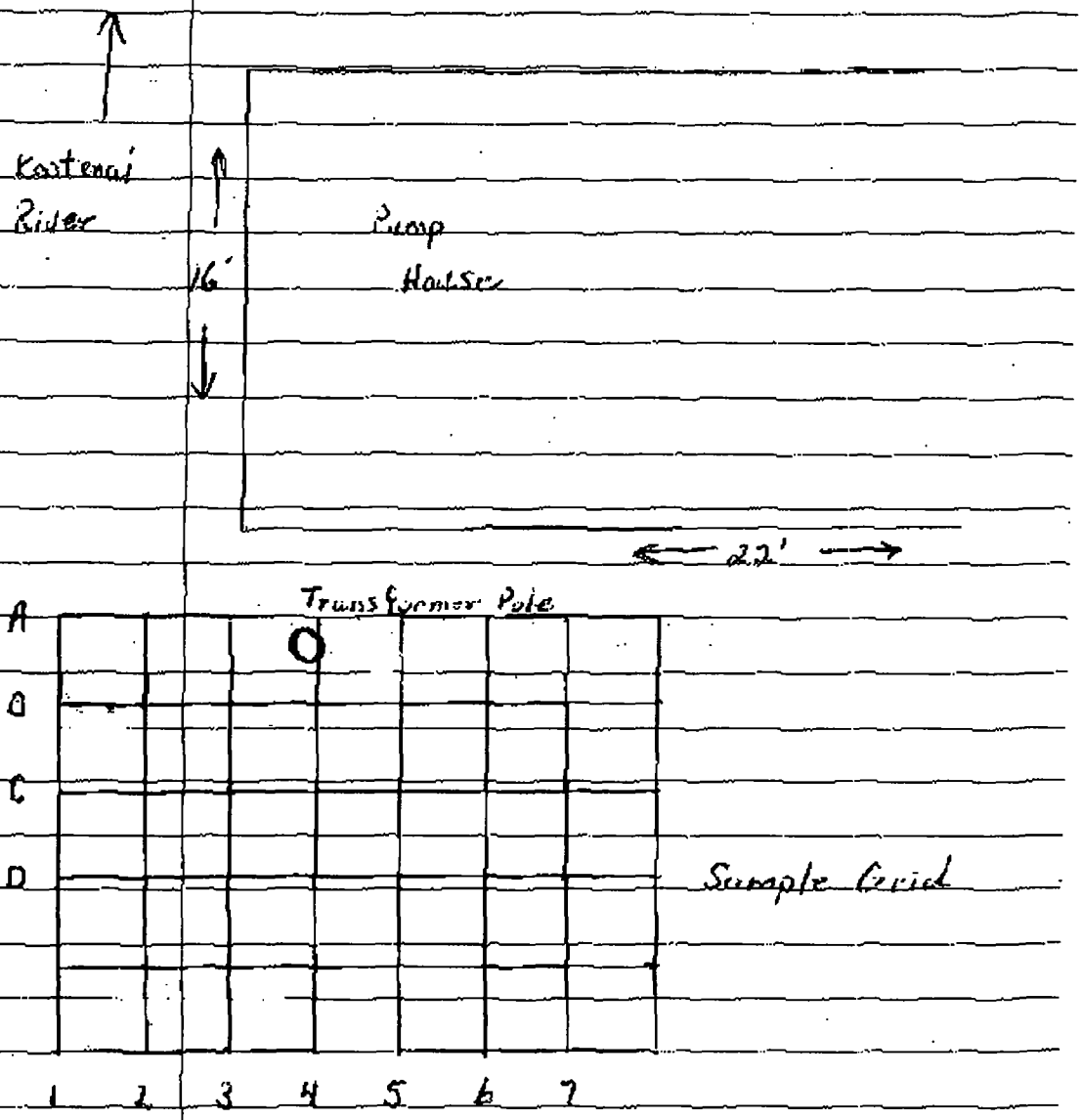
Samples were composite using a Point Source sampling grid as Codified 63 FR 35466 specifies. The area to be sampled was staked out and a grid pattern developed using string. The grid squares erected were 3' square.

The sample area was designated using the Transformer pole as the point source and moving away from the building using the ground contour as a basis for forming the sampling grid.

Samples were taken from a depth of 6", composited in a stainless steel bowl, and shipped in lab provided sample containers. Separate utensils were used for each sample. Samples were shipped to Columbia Analytical Services, Kalso, Wa.

Analysis will be for:

PCB's - Method 8082 LL (Low Level)



Sample Grid

Sample #

Comp. 1 - A3, A4, A5, B3, B4, B5

Comp. 2 - A2, B2, C2, C3

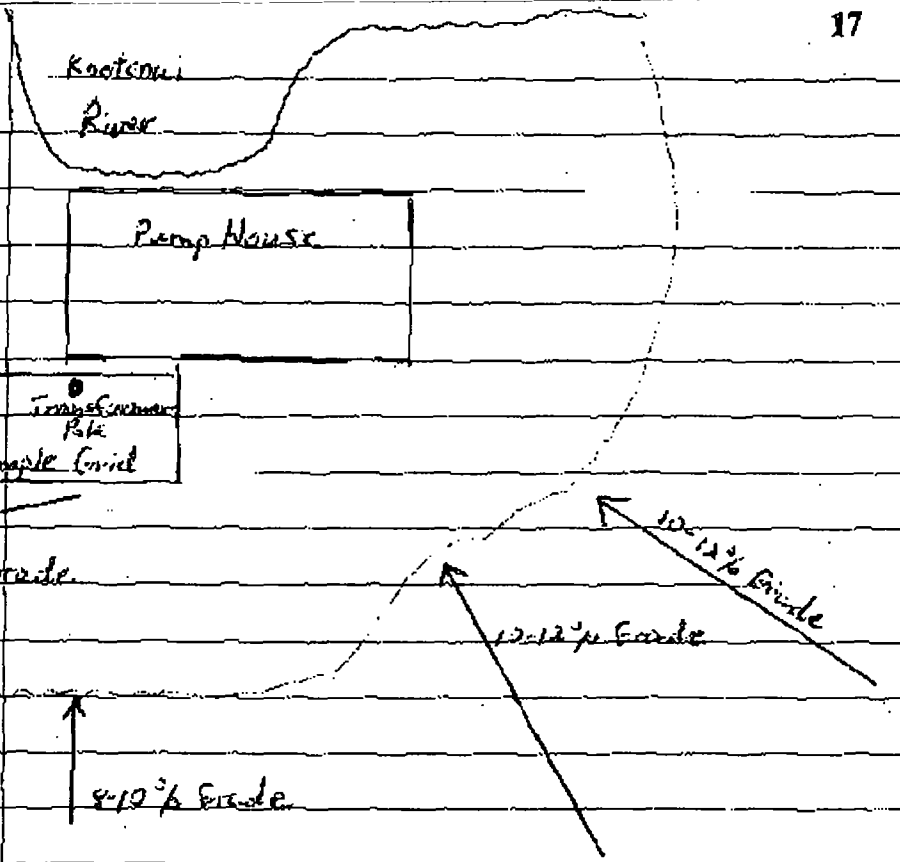
Comp. 3 - C4, C5, C6, B6, A6

Comp. 4 - A1, B1, C1, D1

Comp 5 - D2, D3, D4, D5, D6

Comp. 6 - A7, B7, C7, D7

Comp. 7 - Duplicate of Comp 1



App. Layout and contours of Pump House Area

May 25, 2004

P	101.55	Dry
P-D	Surface Water - Not Measured	
1	103.28	Dry
2	115.14	Water
3	60.51	Dry
4	106.01	Dry
5	104.14	Dry
PZ-1	50.95	Water
2	101.34	Water
3	51.59	Dry
4	40.91	Dry
5	49.82	Dry
6	66.62	Dry
A-8	6.55	Water

6-18-04

P0	1.6' Water
P	102.2 Dry
P1	103.78 Dry
P2	116.8
P3	60.5 Dry
P4	106.0 Dry
P5	104.14 Dry
PM1	50.69
PM2	102.14
PM3	51.59 Dry
PM4	40.91 Dry
PM5	49.52 Dry
PM6	46.62 Dry
AS	7.01

Channel is in good condition - Cleaned Drain Pipe Outlets and some growth from channel.

Dam is in good condition with no changes in appearance

1.22 - 14
P0 - 2.5 Dry
P - 102.2 Dry
P1 - 103.28 Dry
P2 - 119.21
P3 - 60.5 Dry
P4 - 106.0 Dry
P5 - 104.14 Dry
PM1 - 51.72
PM2 - 103.29
PM3 - 51.59 Dry
PM4 - 40.91 Dry
PM5 - 49.82 Dry
PM6 - 66.62 Dry
US - 7.42'
Channel is clear and flowing well.
Dam is in good condition
Overflow channel shows no changes.

8-17-04

P0	2.5' Dry	PM1	51.79'
P	102.2' Dry	PM2	103.34'
P1	103.28' Dry	PM3	51.59' Dry
P2	119.84'	PM4	40.91' Dry
P3	60.5' Dry	PM5	49.82' Dry
P4	106.0' Dry	PM6	66.62' Dry
P5	104.14' Dry	US	7.79'

Dam + Channel are unchanged

9-24-04

PO	2.5' Dry	PM 1	51.81'
P	102.2' Dry	PM 2	103.49'
P1	103.78' Dry	PM 3	51.59' Dry
P2	119.91'	PM 4	40.91' Dry
P3	60.5' Dry	PM 5	49.83 Dry
P4	106.0' Dry	PM 6	66.62' Dry
P5	104.14' Dry	A 8	7.92

Dam & Channel are in good condition.

10-17-04

PO	2.5' Dry	PM 1	51.81'
P	102.2 Dry	PM 2	103.52'
P1	103.78 Dry	PM 3	51.59 Dry
P2	119.89'	PM 4	40.91 Dry
P3	60.50' Dry	PM 5	49.82 Dry
P4	106.0 Dry	PM 6	66.62 Dry
P5	104.14 Dry	A 8	7.91'

Dam & Channel are in good condition

11-19-04

PO	2.5 Dry	PM 1	51.91
P	102.2 Dry	PM 2	103.59
P1	103.78 Dry	PM 3	51.59 Dry
P2	119.90	PM 4	40.91 Dry
P3	60.5 Dry	PM 5	49.82 Dry
P4	106.0 Dry	PM 6	66.62 Dry
P5	104.14 Dry	A 8	7.96'

Dam & Channel are in good condition.

Unable to access site in December & January
No levels or inspections were performed
during this time

2-13-05

PO	2.5' Dry	PM 1	51.87'
P	103.2' Dry	PM 2	103.54'
P1	103.78' Dry	PM 3	51.59' Dry
P2	119.86'	PM 4	40.91' Dry
P3	60.5' Dry	PM 5	49.82' Dry
P4	106.0' Dry	PM 6	66.62' Dry
P5	104.14' Dry	P8	7.86'

3-19-05

PO	1.92'
P	102.2' Dry
P1	103.78' Dry
P2	119.82'
P3	60.5' Dry
P4	106.0' Dry
P5	104.14' Dry
PM1	51.82'
PM2	103.49'
PM3	51.59' Dry
PM4	40.91' Dry
PM5	49.82' Dry
PM6	66.62' Dry
A8	7.79'

Channel is flowing well
Dam is still somewhat covered in snow and
their is no appearance of erosion

4-10-05

PO	1.68' Surface Moist.	PM 1 51.72'
P	102.2' Dry	PM 2 103.32'
P1	103.78' Dry	PM 3 51.59' Dry
P2	119.70'	PM 4 40.91' Dry
P3	60.5' Dry	PM 5 49.82' Dry
P4	102.0' Dry	PM 6 66.62' Dry
P5	104.14' Dry	A 8 5.42'

Dam & Channel are in good condition.

5-25-05

PO	1.42' Surface Water	PM 1 50.92'
P	102.2' Dry	PM 2 103.01'
P1	103.78' Dry	PM 3 51.59' Dry
P2	119.42'	PM 4 40.91' Dry
P3	60.5 Dry	PM 5 49.82' Dry
P4	105.62'	PM 6 66.62' Dry
P5	104.14' Dry	A 8 5.91'

Dam and Channel are in good condition

6-24-05

PO	1.39' Surface Water	PM 1 51.68'
P	102.2 Dry	PM 2 103.29'
P1	103.78 Dry	PM 3 51.59' Dry
P2	112.79'	PM 4 40.91 Dry
P3	60.5' Dry	PM 5 49.82 Dry
P4	102.17'	PM 6 66.62 Dry
P5	101.76'	A 8 6.22'

Cleaned drain pipe outlets and channels of growth

Worked concrete overflow and it is in good condition

Grout on dam is in good condition.

7-19-05

PO	1.72'	PM 1	51.74'
P	102.2' Dry	PM 2	103.46'
P1	103.78' Dry	PM 3	51.59' Dry
P2	119.32'	PM 4	40.91' Dry
P3	60.5' Dry	PM 5	49.82' Dry
P4	106.0' Dry	PM 6	66.62' Dry
P5	104.14' Dry	A 8	7.28'

Dam + Channels are in good condition.

8-27-05

PO	2.5' Dry	PM 1	51.78'
P	102.2' Dry	PM 2	103.64'
P1	103.78' Dry	PM 3	51.59' Dry
P2	119.30'	PM 4	40.91' Dry
P3	60.5 Dry	PM 5	49.82' Dry
P4	106.0 Dry	PM 6	66.62' Dry
P5	104.14' Dry	A 8	7.68'

Dam + Channel are in Good Condition

9-10-05

PO	2.5' Dry	PM1	51.84'
P	102.2' Dry	PM2	103.66'
P1	103.78' Dry	PM3	51.59' Dry
P2	119.32'	PM4	40.91' Dry
P3	60.5' Dry	PM5	49.82' Dry
P4	106.0 Dry	PM6	66.62' Dry
P5	104.14' Dry	A 8	7.76'

Dam + Channel are in Good Condition

10-27-05

P0	2.5 Dry	PM 1	51.94'
P	102.2 Dry	PM 2	103.76'
P1	103.78' Dry	PM 3	51.59 Dry
P2	119.41'	PM 4	40.91 Dry
P3	60.5 Dry	PM 5	49.82 Dry
P4	106.0 Dry	PM 6	65.62' Dry
P5	104.14' Dry	A 8	7.91'

No inspection was performed for Nov., Dec., or Jan. due to access restrictions from winter conditions.

Feb. 24, 2006

P0 - 2.5' Dry
P - 102.1' Dry
P1 - 103.78' Dry
P1 - 119.44'
P3 - 60.5' Dry
P4 - 106.0' Dry
P5 - 104.14' Dry
PM1 - 51.95'
PM2 - 103.79'
PM3 - 51.59' Dry
PM4 - 40.91' Dry
PM5 - 49.82' Dry
PM6 - 65.62' Dry
A8 - 7.92'

Channels are in good condition and flowing well.

Dam is in good, surface soils are soft from spring thaw

3-12-06

P0 - 1.46' Surface Water
P - 102.2' Dry
P1 - 103.78' Dry
P2 - 119.52'
P3 - 60.5' Dry
P4 - 106.0' Dry
P5 - 104.14' Dry

PM-1 - 51.62'
PM-2 - 103.39'
PM-3 - 51.59' Dry
PM-4 - 40.91' Dry
PM-5 - 49.82' Dry
PM-6 - 65.62' Dry
A-8 - 6.18'

Dam & Channel are in good condition

4-07-06

P0 - Not taken due to surface water
P - 102.2' Dry
P1 - 102.64'
P2 - 114.34'
P3 - 60.5' Dry
P4 - 103.42'
P5 - 104.14' Dry

PM1 - 51.14'
PM2 - 99.79'
PM3 - 51.59' Dry
PM4 - 40.91' Dry
PM5 - 49.82' Dry
PM6 - 65.62' Dry
A8 - 4.96'

Dam and Channel are in good Condition

May 27, 2006

P0 - Not taken due to surface water
P - 102.2' Dry
P1 - 101.02'
P2 - 109.78'
P3 - 60.5' Dry
P4 - 108.23'
P5 - 104.14' Dry

PM1 - 50.76'
PM2 - 98.92'
PM3 - 51.59' Dry
PM4 - 40.91' Dry
PM5 - 45.82' Dry
PM6 - 6562' Dry
A8 - 4.98'

Dam and Channel are in good condition

6-21-06

P0 - 1.12' PM1 - 51.23'
P - 102.2 Dry PM2 - 101.62'
P1 - 103.78' Dry PM3 - 51.59' Dry
P2 - 110.89' PM4 - 40.91' Dry
P3 - 60.5' Dry PM5 - 49.82' Dry
P4 - 105.23' PM6 - 65.62' Dry
P5 - 101.14' A8 - 6.18'
Dam and Channels are in good condition.
Cleaned drain pipe outlets and channels of growth.

7-26-06

P0 - 1.81' PM1 - 51.61'
P - 102.2 Dry PM2 - 103.32'
P1 - 103.78 Dry PM3 - 51.59 Dry
P2 - 110.14' PM4 - 40.91 Dry
P3 - 60.5 Dry PM5 - 49.82 Dry
P4 - 104.14' Dry PM6 - 65.62' Dry
P5 - ~~104.14' Dry~~ A8 - 7.42'
Dam/channel are in good condition

8-16-06

P0 - 2.5' Dry PM-1 - 51.72'
P - 102.2' Dry PM-2 - 103.51'
P1 - 103.78' Dry PM-3 - 51.59' Dry
P2 - 109.39' PM-4 - 40.91' Dry
P3 - 60.5' Dry PM-5 - 49.82' Dry
P4 - 106.5' Dry PM-6 - 65.62' Dry
P5 - 104.14' Dry A-8 - 7.72'
Dam and channel are in good condition

Inspection was not performed in Sept. due to extensive travel out of town on other projects Ron C

10-30-06

P0 -	2.5' Dry	PM1 - 51.82'
P -	102.2' Dry	PM2 - 103.69'
P1 -	103.78' Dry	PM3 - 51.59' Dry
P2 -	119.48'	PM4 - 40.91' Dry
P3 -	60.5' Dry	PM5 - 49.82' Dry
P4 -	106.0' Dry	PM6 - 65.52' Dry
P5 -	104.14' Dry	A8 - 7.92'

Dam & Channel are in good condition.

11-14-06

P0 -	2.5' Dry	PM1 - 51.88'
P -	102.2' Dry	PM2 - 103.72'
P1 -	103.78' Dry	PM3 - 51.59' Dry
P2 -	119.41'	PM4 - 40.91' Dry
P3 -	60.5' Dry	PM5 - 49.82' Dry
P4 -	106.0' Dry	PM6 - 65.52' Dry
P5 -	104.14' Dry	A8 - 7.96'

Dam and Channel are in good condition.

No inspections were performed for Dec., Jan., & Feb due to road being closed by winter conditions.

March 2, 2007 Ron C

KALISPELL WATER RESOURCES REGIONAL OFFICE
DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

BRIAN SCHWEITZER
GOVERNOR

109 COOPERATIVE WAY
SUITE 110

STATE OF MONTANA

PHONE: (406) 752-2288
FAX: (406) 752-2843

KALISPELL, MONTANA 59901-2387

January 19, 2007

Bob Marriam
c/o Remedium Group, Inc.
6401 Poplar Ave., Suite 301
Memphis, Tennessee 38119

Re: Kootenai Impoundment Dam Site Inspection and Owners Manual

Dear Mr. Marriam,

As you are aware, on January 5th, 2007 I made a site visit to the Kootenai Impoundment Dam. I have enclosed a copy of the site inspection report that I have sent to the Dam Safety Program Manager.

I have updated the names and telephone numbers in the Emergency Action Plan (EAP) in the Owners Manual and I have updated all the information that I could. I have made you a hard copy of the manual and it is enclosed. Many of the documents in the original manual have all ready been scanned in as either Adobe documents or jpeg images and a CD of all these documents is enclosed. There is a Word® copy of a new generic EAP template that dam safety is using on the CD. I used the document that you sent to me in this owner's manual and it will work just as well.

One of the more useful documents in an EAP is the mapping. There were no good quality maps in this document so I had to make two of the maps; a road map and an evacuation map. I generated the evacuation map from my local area knowledge and a topographic map. These maps will work for now but you must plan on having your engineer make a new evacuation map. In addition we need your engineer to provide an inundation map that shows the time of arrival of clear weather, full pool breach wave at various downstream cross sections with the elevation of flows at the cross sections and the amount of anticipated flows. We can provide your engineer with the details of the breach analysis if they have questions.

As we have discussed you will need to plan to make an annual owners inspection and we can help get one of your contractors trained in owner's inspections if you need. We have already provided a couple of owner's inspection forms and there are also examples in the Owners manual. Please let us know if we can be of assistance with training. I will continue to encourage the Dam Safety program to get one our engineers HAZMAT trained so that we can be on site during the inspections in the future. Please remember that you will need to plan for the Operational Permit renewal

due in 2009. You will need to have a licensed professional engineer (P.E.) experienced in dam safety do an inspection and supply you with a P.E. stamped report. Again, we can provide your engineer direction and examples of operational permit renewal inspections and reports.

I have sent copies of the new EAP to the Lincoln County Emergency Management and Sheriffs office. I will pursue their signatures on the updated EAP and then send you the originals when that is completed. You will then need to sign and return the document with all the original signatures to me. Keep a copy for your Owners Manual and I will make copies for Lincoln County the Dam Safety Program. I anticipate I will get the signatures back around the 1st of February so keep an eye out for the letter and return it as soon as possible.

Please let me know if I can be of further assistance.

Respectfully,

Kurt Hafferman, Manager
DNRC Water Resources Kalispell Regional Office

CC; Michele Lemieux, DNRC WRD
Art Robinson, DNRC WRD
Larry Schock, DNRC WRD Missoula

DNRC WATER RESOURCES
Kalispell Regional Office

Memorandum

To: Michele Lemieux

From: Kurt Hafferman, Manager DNRC WRD KRO KH

CC: Laurence Siroky, DNRC WRD WOB Chief
Larry Schock, DNRC WRD MRO Engineering Technician
Bob Marriam, W.R. Grace
Paul Lamers, CDM, Libby

Date: 1/9/2007

Re: Rainy Creek Dam, a.k.a. Kootenai Impoundment, a.k.a W.R. Grace Dam

Introduction

On January 3rd, 2007 there was an Email exchange between Pat Platenberg of the DEQ Environmental Management Bureau, Hard Rock Section and Laurence Siroky. A copy of the Email is attached in Appendix A, page A1 to this memorandum.

After that Email I received a conference call from Laurence and Art Robinson and it was decided that I would attempt to make contact with W.R. Grace or the US EPA in Libby and try to schedule a site visit to check out Mr. Platenberg's concerns. The dam safety programs last contact with anyone concerning this dam was reported to be Jim Christiansen of the US EPA in 2003.

Contacts and telephone numbers

I called the Libby EPA telephone number for Mr. Christiansen and first talked to a Linda Neustrom (sp) who then directed me to a Paul Lamers (sp) who worked for a company called CDM. CDM is a consultant to the US EPA and is on contract to do clean up in Libby. CDM is not doing any work near the impoundment dam so they did not have any information on the dam. Paul stated that he had heard "through the grapevine" that there was a concern about the dam so he expected a call but did not know why. He stated that as far as he knew there was nothing unusual going on at the dam or in Rainy Creek. Paul stated that CDM did not have engineers on staff that could asses the dam so they felt that we should send someone if there was a concern. Paul Peronard of the Denver EPA is Paul Lamers contact at the EPA. Paul Peronard's office telephone number is 303-312-6806 and his cell telephone is 303-886-1638. Paul Lamers stated that Mr. Peronard was adamant that the only way to access the site was by having 40-hour HAZMAT training and proper equipment and clothing or I would have to stay inside of a seal vehicle. A vehicle only site visit was set for Friday, January 5th at 10:00 a.m. Paul Larners arranged for a vehicle and driver and said he would call their W.R. Grace contact, Bob Marriam.

On Thursday the 4th I received a call from Bob Marriam from W.R. Grace. Bob asked what the concern was, stated that he did not have an engineer on site that could make the assessment and said he would have a local

W.R. Grace contractor along on the visit to report back to him. Their local contractor is Mike Chapman, at 406-293-1983. Mike called on Thursday and arranged to be at the site visit as well.

Site Visit

At the CDM office in Libby I met with with Paul Lamers, Shawn Olivera (CDM safety training officer) and Mike Chapman. Shawn gave me a 15 minute EPA Libby Asbestos Pre-Entry Orientation training. A copy of the training handout is attached to the appendix on pages A2a to A2o. Mike and I then discussed the nature of the site visit, the need to update the EAP and operation guide, doing annual inspections and preparing for the 5-year permit renewal inspection. I showed Mike the exact pages in the EAP where the telephone numbers and names would need to be updated and he stated that he would call Bob Marriam and have him respond to those issues right away.

We departed Libby at 11:00 a.m. and arrived at the dam site at 11:30 a.m. It was apparent that there had been rain on top of the existing snow pack but there were no signs that the rain had caused any of the snow to melt and runoff. There were no signs that the pool elevation had changed or that there had been any water flow through the spillway entrance channel or spillway chute. A photograph of the existing pool is shown on page A3 and a photograph of the spillway chute is shown on page A4. There was no trash in the spillway entrance channel trash rack and the spillway chute was still covered with clean snow so it seemed apparent that there had not been any water through the spillway chute since at least the last snow storm. I was not able to view the entire dam from the truck but I did not notice any anomalies on the dam crest, upstream face, downstream face or toe of the dam. There were no signs of high water in the Rainy Creek stream channel below the dam or at the highway crossing.

While at the dam site I point out the features of the dam to Mike Chapman and explained the type of information we would be looking for during an annual inspection. We also talked about routine monitoring that could be set up in Rainy Creek at the highway crossing to monitor stream flows below the dam. I again discussed the need to get the EAP telephone numbers and names corrected as soon as possible and to start to find a licensed engineer who had dam safety experience and HAZMAT training. We departed the site at 12:00.

Conclusions

- At this point Bob Merriam is the W. R. Grace representative and main contact on all issues concerning the dam. His Email is robert.r.marriam@grace.com. His address is 6401 Poplar Ave, Suite 301, Memphis TN, 38119. Mike Chapman is a local contractor that has the necessary HAZMAT training to be on site and does various projects in this area for W.R. Grace but he will be contacted by Bob Merriam if he is needed.

    - Mr. Merriam contacted me Monday, January 8th and asked that I scan the pages of the EAP that had telephone numbers on them and sent them to him to correct. You were forwarded a copy of that Email. I also sent the hard copy to Mr. Merriam in the mail.

    - I will get the correct telephone numbers and names and I can help Mr. Merriam reformat the pages for the EAP. If you want, once he as all the correct copies I can forward the corrected pages to you.

    - Mr. Merriam stated that he can not find the EAP or Kootenai Impoundment Dam owners manual and any other documentation for the dam. I assume that they have had several engineer and owner issues over the last couple of years and it may take a while to track down the files. I told him that once we get the telephone numbers and names updated I would at least send him an updated copy our EAP Kootenai Impoundment Dam owners manual until he finds the original. If we have a scanned copy of this file we may want to send it to him as a courtesy.

    - It is apparent that there has been a loss of institutional knowledge on this dam during the ownership and engineers issues that have gone on here over the last few years. In my opinion the dam appears to be in good shape and it is not currently impounding any water near the dam

but I think we should also continue to recommend they get someone who can make an annual inspection as soon as possible as it appears to have been awhile since it was inspected.

- CDM and EPA will be involved if any access to the site is required. Any one who wants access to the dam site outside of a vehicle must be 40-hour Operational HAZMAT trained, properly equipped with the proper HEPA filter respirator, have a Tyvek suit, and be accompanied by a CDM employee. After the Friday site visit it is apparent that for most normal access, unless a person is HAZMAT trained, it is going to be quite a hassle. In this case, if it had it not been for the correct weather conditions and if not for Paul Lamers willingness to quickly call the correct people, it may have taken days or weeks to get the proper access permission.

- This dam may not always be the biggest issues for W.R. Grace and it may be that the real institutional knowledge on this project may end up resting with the dam safety program, as was the case here. We had more knowledge that any of the DEQ, EPQ, CDM, or W.R. Grace people combined. Therefore, unless W.R. Grace finds an experienced engineer that will completely take over the project, annual inspections and all, and because this is such a large structure with many complicated components, it may always be best if we have an engineer go along on the annual inspections and possibly attend the permit renewal inspections. Therefore I would recommend that we investigate the cost of the HAZMAT training. If it is feasible, I would be willing to take the training.

APPENDIX A

A1 - EMAIL EXCHANGE BETWEEN PLATENBERG AND SIROKY

A2a to A2o - EPA LIBBY ASBESTOS PRE-ENTRY ORIENTATION

A3 - PHOTOGRAPH OF EXISITNG POOL

A4 - PHOTOGRAPH OF THE CONCRETE CHUTE SPILLWAY

Hafferman, Kurt

From: Hafferman, Kurt
Sent: Wednesday, January 03, 2007 11:57 AM
To: Siroky, Laurence
Cc: Schock, Larry; Lemieux, Michele
Subject: RE: Rainy creek Impoundment

Tracking:

Recipient	Read
Siroky, Laurence	
Schock, Larry	Read: 1/3/2007 12:58 PM
Lemieux, Michele	Read: 1/3/2007 11:59 AM

It is raining and may be problematic with the current snow pack. I am not sure about the hazmat clothing and training but I have time to go if need be. Besides, I probably have reached my asbestos saturation levels anyway! We would need access as the gates are locked. Who is Pat?

From: Siroky, Laurence
Sent: Wednesday, January 03, 2007 11:48 AM
To: Plantenberg, Pat
Cc: Lemieux, Michele; Hafferman, Kurt; Schock, Larry
Subject: RE: Rainy creek Impoundment

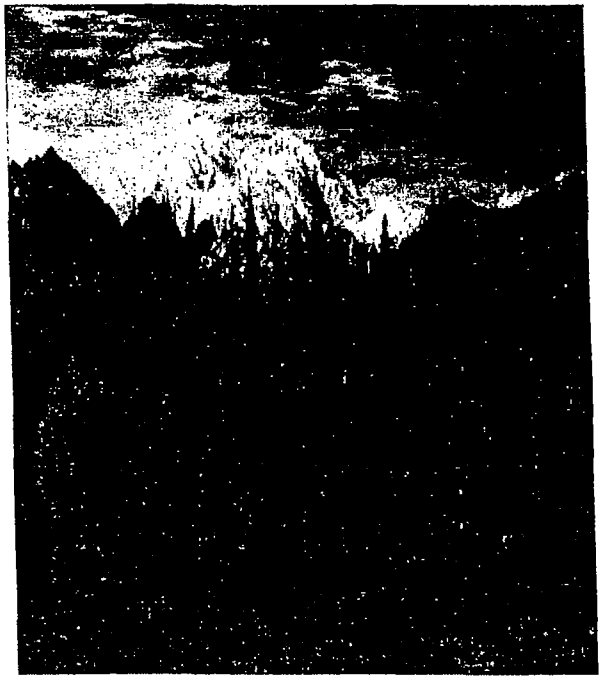
Pat
The dam, I assume you are referring to the W. R. Grace or Kootenai Development Corp. dam. We don't have anyone with the required training or equipment. I understand that anyone going on the site has to have hazmat training, be properly clothed and equipped.

I know from being out there that the rectangle channel connecting the outlet from the dam to the spillway collects debris and rocks from the hillside above or vandals and should be checked. Since the dam very seldom has water stored or flows thru the spillway, a visual walkover of the dam and spillway is a good idea.
Laurence

From: Plantenberg, Pat
Sent: Wednesday, January 03, 2007 10:04 AM
To: Siroky, Laurence
Cc: Freshman, Charles; Rolfes, Herb
Subject: Rainy creek Impoundment

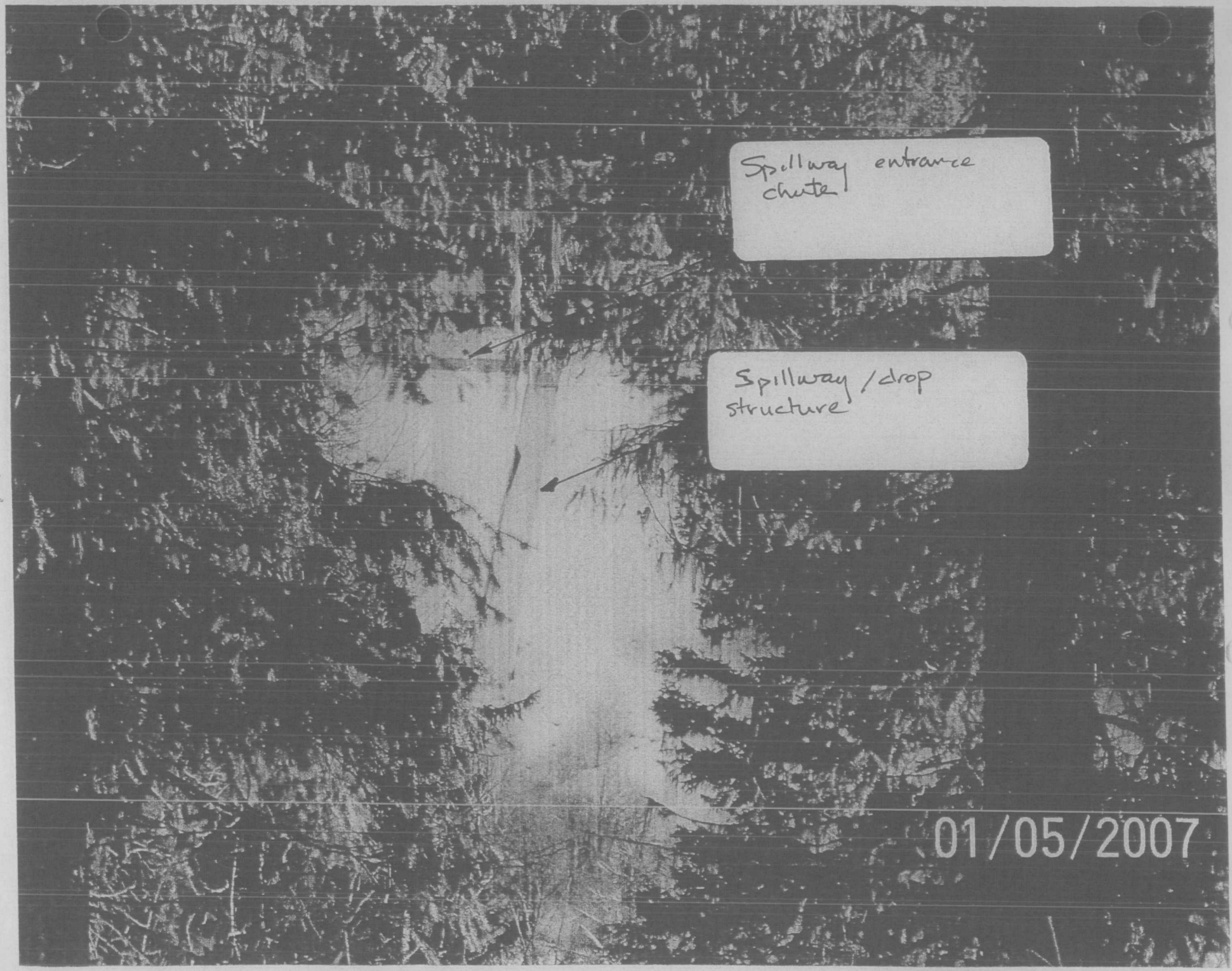
Dear Laurence: Just heard that Libby is getting lots of rain. We may have water flowing out of the Rainy Creek impoundment. Is there anyone that could check? If not I may be able to get someone from the USFS to check. Thankx Patrick

EPA - Libby Asbestos Remediation Project Pre- Entry Orientation



Welcome


01/05/2007


Spillway entrance chute
Spillway / drop structure
01/05/2007

DEPARTMENT OF NATURAL RESOURCES
AND CONSERVATION

BRIAN SCHWEITZER
GOVERNOR

DIRECTOR'S OFFICE (406) 444-2074
TELEFAX NUMBER (406) 444-2684

STATE OF MONTANA

WATER RESOURCES DIVISION (406) 444-6601
TELEFAX NUMBERS (406) 444-0533 / (406) 444-5918
http://www.dnrc.mt.gov

1424 9TH AVENUE
PO BOX 201601
HELENA, MONTANA 59620-1601

May 25, 2006

Kootenai Development Co.
Alan Stringer
Po Box 695
Libby, MT 59923

Re: Second Notice

Dear Alan Stringer,

This is our **second notice** sent in regard to your dam's Emergency Action Plan (EAP). According to our records, it is time for you, as the dam owner of Kootenai Development Impoundment Dam, to review and update your EAP.

The primary purpose of an Emergency Action Plan is to minimize the loss of life in the event of a dam failure, therefore it is critical for you to verify that **ALL** telephone and pager numbers are correct and functional and **ALL** names listed in your plan are current.

We have included an EAP update checklist for your convenience. Please use this checklist to verify that the information in your EAP is current and correct. If you find information that is not correct please document the corrections on the checklist so we can work together to update your EAP. Please return the checklist to our office by June 26, 2006. We have enclosed a self addressed stamped envelope for your convenience. You must return the checklist even if no changes are necessary.

> According to Administrative Rule 36.14.406 "The owner shall annually review and update the emergency procedures and warning plan." Further the statue provides that "an owner of a dam with an impounding capacity of 50 acre-feet or greater measured at the maximum normal operating pool who fails to comply with a provision of this chapter or a rule or order of the department adopted or made pursuant to his chapter is subject to a civil penalty not to exceed $1,000. Each day of violation is a separate offense."

If you have any questions please contact me or your local DNRC Regional Engineer.

Thank you for your cooperation.

Sincerely,

Windy Pennington
Dam Safety Program Assistant
406-444-6632
wpennington@mt.gov

CC: Regional Engineer

KOOTENAI DEVELOPMENT IMPOUNDMENT

INSPECTION LOG

PERIODIC INVESTIGATIONS

KOOTENAI DEVELOPMENT IMPOUNDMENT

PERIODIC INVESTIGATIONS

Montana Dam Safety Laws require that all "high hazard" dams be investigated periodically (but not less than once every five years) by a knowledgeable, professional engineer who is licensed in the state of Montana. The investigation is to be detailed and accompanied by photo documentation. The investigating engineer is to use his/her dam safety knowledge and experience to critically evaluate the conditions of the Kootenai Development Impoundment and Dam, record any areas of concern, and assist in developing required appropriate correction action. The Dam Inspection Checklist covering all aspects of the dam and impoundment conditions must be completed as a minimum, but the investigating engineer may use any additional tools required to complete a thorough review of the dam and impoundment. A copy of this checklist is included in this section.

Remedium Group, Inc will review the completed investigation report and arrangements will be made to act promptly on any reported areas of concern. A copy of this report will be forwarded within 90 days to the Dam Safety Section of the Montana Department of Natural Resources and Conservation.

Arrowhead Engineering of Libby, Montana, carried out the most recent periodic investigation in 2004. A copy of that Report of Inspection is included in this section.

KOOTENAI DEVELOPMENT IMPOUNDMENT
DAM PERIODIC INVESTIGATION

Dam Name: _____

Dam Observer: _____ Observation Date: _____

Reservoir Elevation: _____ Weather Conditions: _____

AREA INSPECTED	EMBANKMENT			CHECK ACTION NEEDED		
	ITEM NO.	CONDITION	OBSERVATIONS	MONITOR	INVESTI-GATE	REPAIR
CREST	1	SURFACE CRACKING				
	2	CAVE IN, ANIMAL BURROW				
	3	LOW AREA(S)				
	4	HORIZONTAL ALIGNMENT				
	5	RUTS AND/OR PUDDLES				
	6	VEGETATION CONDITION				
	7					
	8					
UPSTREAM SLOPE	9	SLIDE, SLOUGH, SCARP				
	10	SLOPE PROTECTION				
	11	SINKHOLE, ANIMAL BURROW				
	12	EMB-ABUT CONTACT				
	13	EROSION				
	14	VEGETATION CONDITION				
	15					
	16					

ADDITIONAL COMMENTS: REFER TO ITEM NO., IF APPLICABLE

KOOTENAI DEVELOPMENT IMPOUNDMENT
DAM PERIODIC INVESTIGATION

Dam Name: _____

Dam Observer: _____ Observation Date: _____

Reservoir Elevation: _____ Weather Conditions: _____

AREA INSPECTED	EMBANKMENT (CONT'D)			CHECK ACTION NEEDED		
	ITEM NO.	CONDITION	OBSERVATIONS	MONITOR	INVESTI-GATE	REPAIR
DOWNSTREAM SLOPE	17	WET AREA(S) (NO FLOW)				
	18	SEEPAGE				
	19	SLIDE, SLOUGH, SCARP				
	20	EMB-ABUT CONTACT				
	21	CAVE IN, ANIMAL BURROW				
	22	EROSION				
	23	UNUSUAL MOVEMENT				
	24	VEGETATION CONDITION				
	25	REMOVAL OF TREES/SHRUBS (a)				
	26					
INSTRUMENTATION	27	PIEZOMETERS/OBSERV. WELLS				
	28	STAFF GAUGE AND RECORDER				
	29	WEIRS				
	30	SURVEY MONUMENTS				
	31	DRAIN'S				
	32	FREQUENCY READINGS				
	33	LOCATION OF RECORDS				
	34					

ADDITIONAL COMMENTS: REFER TO ITEM NO., IF APPLICABLE

(a) Trunk diameters larger than 2 inches.

KOOTENAI DEVELOPMENT IMPOUNDMENT
DAM PERIODIC INVESTIGATION

Dam Name: _____

Dam Observer: _____ **Observation Date:** _____

Reservoir Elevation: _____ **Weather Conditions:** _____

AREA INSPECTED	DOWNSTREAM AREA & MISCELLANEOUS			CHECK ACTION NEEDED		
	ITEM NO.	CONDITION	OBSERVATIONS	MONITOR	INVESTI-GATE	REPAIR
DOWNSTREAM AREA	35	ABUTMENT LEAKAGE				
	36	FOUNDATION SEEPAGE				
	37	SLIDE, SLOUGH, SCARP				
	38	DRAINAGE SYSTEM				
	39					
	40					
	41	HAZARD DESCRIPTION				
	42	DATE OF LAST UPDATE OF EAP				
MISCELLANEOUS	43	RESERVOIR SLOPES				
	44	ACCESS ROADS				
	45	SECURITY DEVICES				
	46					
	47					
	48					
	49					
	50					

ADDITIONAL COMMENTS: REFER TO ITEM NO., IF APPLICABLE

KOOTENAI DEVELOPMENT IMPOUNDMENT
DAM PERIODIC INVESTIGATION

Dam Name: _____

Dam Observer: _____ Observation Date: _____

Reservoir Elevation: _____ Weather Conditions: _____

AREA INSPECTED	SPILLWAYS			CHECK ACTION NEEDED		
	ITEM NO.	CONDITION	OBSERVATIONS	MONITOR	INVESTI-GATE	REPAIR
ERODIBLE CHANNEL	51	SLIDE, SLOUGH, SCARP				
	52	EROSION				
	53	VEGETATION CONDITION				
	54	DEBRIS				
	55					
	56					
NON-ERODIBLE CHANNEL	57	SIDEWALLS				
	58	CHANNEL FLOOR				
	59	UNUSUAL MOVEMENT				
	60	APPROACH AREA				
	61	WEIR OR CONTROL				
	62	DISCHARGE AREA				
	63	CRACK WIDTH-BOX CULVERT (a)				
	64					
DROP INLET	65	INTAKE STRUCTURE				
	66	TRASH RACK				
	67	STILLING BASIN				
	68					
	69					

ADDITIONAL COMMENTS: REFER TO ITEM NO., IF APPLICABLE

(a) Bottom of box culvert through dam.

ARROWHEAD ENGINEERING, Inc.

P.O. Box 843
1504 Kanuksu Avenue
Libby, Montana 59923

Phone (406) 293-9197
Fax (406) 293-8922
Email arrowhead@libby.org

May 31, 2004

Alan Stringer
Kootenai Development Co.
P.O. Box 695
Libby, MT 59923

Re: **Kootenai Development Impoundment Dam**
Engineer's Report of Periodic Inspection (per MCA 36.14.603)

Dear Mr. Stringer:

Per your request, I have conducted an inspection on May 25, 2004 of the Kootenai Development Impoundment Dam (NW ¼ of Section 22, Township 31N, Range 30W, Lincoln County, Montana) and the accompanying documentation. The purpose of the impoundment inspection and documentation review was to comply with Montana Code Annotated 36.14.603 which pertains to periodic inspections of high risk dams in Montana. The remainder of this letter report presents the results of the field inspection and review of documentation along with recommendations, including timelables, and conclusions.

DOCUMENTATION REVIEW

The review of the documentation included the Standard Operating Procedures (J. Wolter, January 1, 1995), the Emergency Action Plan dated January 1, 1999, and the Maintenance Procedures (J. Wolter, January 1, 1995). In addition to this, the past piezometer readings dated June 28, 2003 to the present were also reviewed. Copies of the piezometer readings and logbook entries are included as Attachment 1.

DAM INSPECTION

On May 25, 2004, I traveled to the Kootenai Impoundment Dam located approximately one mile up the Rainy Creek Road to conduct the visual inspection of the dam. The checklists filled out during the inspection are included in Attachment 2. Digital photographs were taken of various items identified during the inspection. A copy of these photographs is included in Attachment 3. The observations are as follows:

1. The piezometers were not labeled and several of the piezometers are difficult to locate due to the height of surrounding vegetation.

2. There was significant woody foliage growing on the upstream face of the dam, especially between piezometers P2 and P5. Much of this foliage consisted of Cottonwood trees with trunk diameters greater than 1-1/2 inches (Photograph #4 - Attachment 3).

3. The piezometers in the upstream face of the dam are generally bent slightly to the northeast. The piezometer's orientation has not appeared to have changed in the last several years.

4. In general, the upstream face of the dam has good grass growth with only one slight erosion rill evident near piezometer P5 (Photograph #3 – Attachment 3). This erosion area has vegetation established within the bottom and sides.

5. The inlet to the overflow channel was intact and clear of any rocks, shrubs or debris. A good grass growth was evident.

6. A slight crack (less than 1/16") is evident in the center of roof and floor, parallel with the centerline of the culvert, of the concrete box culvert though the dam. There was no evidence of moistura in or around the cracks.

7. Cottonwood trees are present in the energy dissipation pool at the outlet of the emergency spillway (Photograph #6 – Attachment 3).

8. In general, there were no erosion rills on the downstream face of the dam with the exception of the small erosion rill near piezometer PM5 (Photograph #7 – Attachment 3). Vegetation is present in this erosion rill indicating that it has not changed much in several years.

9. There were no wet areas at the toe of the dam that could indicate a blocked toe drain.

10. At the time of the inspection, the toe drains were clear and free of moss and algae buildup. Water was flowing from most of the toe drains. The total combined toe drain discharge was estimated at approximately 30 to 50 gallons per minute.

11. There is a small pine tree (~4" diameter) growing in the in the face of the dam (downstream slope) as shown in Photograph #9 (Attachment 3).

12. There is significant woody vegetation (typically Cottonwoods and Willows) growing near the toe drain outlets (Photograph #8 – Attachment 3).

13. The downstream concrete outflow channel was intact and clear of debris.

14. The rock-lined energy dissipation pool at the end of the outflow channel was intact; however, there were Cottonwood trees present within the pool (Photograph #6 – Attachment 3).

15. The intersection of the tailrace discharge and underflow stream was intact, well vegetated, and showed no signs of potential future failure.

16. Water levels were measured using an electronic water level probe (Photograph #2 – Attachment 3) in fourteen (14) piezometers and the results are provided in Attachment 1. Only five (5) of the piezometers contained measurable water.

17. There was no apparent evidence of burrowing animal activity in the dam.

RECOMMENDATIONS

1.0 The dam is in good condition based on the visual observations and a review of the inspection records. Documentation of the water levels in the piezometers and cleaning of the toe dreins is adequately presented in the logbook. However, an annual inspection should be completed using the checklists contained in the appendix of the Maintenance Manual. I would recommend that these be used on the next annual inspection and the forms filed with the logbook.

Recommended time to implement: By next annual inspection

2.0 The contact people and phone numbers in the Standard Operating Procedures and the Emergency Action Plan should be updated. There are several people and businesses identified in the plan that are no longer available in the Libby area. An updated copy of the plans should be sent to the same people that have previously received them or who are added to the list.

Recommended time to implement: By October 15, 2004

3.0 To comply with the Maintenance Procedures Manual, trees and shrubs with a trunk diameter of greater than 2 inches on the upstream and downstream faces of the dam should be removed.

Recommended time to implement: By October 15, 2004

4.0 The piezometers should be labeled and a wooden or metal stake placed near each piezometers to aid in locating it in deep vegetation or snow cover conditions.

Recommended time to implement: By October 15, 2004

5.0 The Cottonwood trees should be removed from the energy dissipation pool to prevent plugging during a possible over-flow episode.

Recommended time to implement: By October 15, 2004

6.0 Willows and some Cottonwoods are growing at the outlets of the toe drains. These should be cut back at least five (5) feet around each toe drain. That way free and clear access will be maintained and root structures will not begin to interfere with the operation of the toe drains.

Recommended time to implement: By October 15, 2004

CONCLUSION

The dam and associated components are in excellent shape and have been well maintained. Other than the recent logging activity in the drainage that could potentially affect runoff characteristics, I see no significant changes that would lead me to believe that the dam has any major weaknesses that need to be addressed. However, the minor issues listed in the recommendations section should be addressed to further improve the safe operation of the dam. To ensure completion of the recommendations, I would suggest that I be contacted after the items are completed. That way I can document that the recommendations have been properly addressed in the logbook.

Sincerely,

David Cosgriff, P.E.

Attachments: Attachment 1 – Piezometer Water Level Readings
Attachment 2 – Completed Inspection Checklists
Attachment 3 – Photographs

C: File

Attachment 1

Plezometer Readings – Logbook Copies

Aug. 29, '02

Dam Inspection Water Levels

PO	2.05' Dry	PM1	50.96'
P	102.2' Dry	PM2	99.64'
P1	103.78' Dry	PM3	51.55' Dry
P2	117.82'	PM4	41.02' Dry
P3	60.5' Dry	PM5	49.84' Dry
P4	106.0' Dry	PM6	65.52' Dry
P5	104.19' Dry	A8	6.76'

9-30-02

Dam Inspection and Monitoring Well Water Levels

PO	2.05' Dry	PM1	51.55'
P	102.2' Dry	PM2	103.12'
P1	103.78' Dry	PM3	51.59' Dry
P2	119.28'	PM4	41.02' Dry
P3	60.5' Dry	PM5	49.84' Dry
P4	106.0' Dry	PM6	65.52' Dry
P5	104.17' Dry	A8	7.22'

Channel and Dam are in good condition

Channel Lower channels and Drain Pipe outlets sprouted.

10-15-02

Dam Inspection

PO	2.05' Dry	PM1	51.74'
P	102.2' Dry	PM2	103.36'
P1	103.78' Dry	PM3	51.59' Dry
P2	119.34'	PM4	41.02' Dry
P3	60.5' Dry	PM5	49.84' Dry
P4	106.0' Dry	PM6	65.52' Dry
P5	104.17' Dry	A8	7.77'

11-19-02

Dam Inspection

PO	2.05' Dry	PM1	51.94
P	102.2 Dry	PM2	104.74
P1	103.78 Dry	PM3	51.59' Dry
P2	119.78	PM4	41.02 Dry
P3	60.5 Dry	PM5	49.84 Dry
P4	~~104~~ 106.0 Dry	PM6	65.52 Dry
P5	104.17 Dry	A8	7.62

Dam inspect and

Dec 5, 2002

Dam Inspect. Water Levels

PO	2.05' Dry	PM1	52.68'
P	102.2' Dry	PM2	103.88'
P1	103.78' Dry	PM3	51.59' Dry
P2	119.76'	PM4	41.02' Dry
P3	60.5' Dry	PM5	49.84' Dry
P4	106.0' Dry	PM6	65.52' Dry
P5	104.17' Dry	A8	7.68'

January

No Levels Taken due to weather

Feb. 24 ~~02~~ 03

PO	2.05' Dry	PM1	52.74'
P	102.2' Dry	PM2	103.90'
P1	103.78' Dry	PM3	51.59' Dry
P2	119.82'	PM4	41.02' Dry
P3	60.5' Dry	PM5	49.84' Dry
P4	106.0' Dry	PM6	65.62' Dry
P5	104.17' Dry	A8	7.62'

3-28-03

Dam inspect

PO	1.42'	PM 1	51.99'
P	102.2' Dry	PM 2	102.71'
P1	103.78' Dry	PM 3	51.59' Dry
P2	119.69'	PM 4	41.02' Dry
P3	60.5' Dry	PM 5	49.84' Dry
P4	106.0' Dry	PM 6	65.52' Dry
P5	104.17' Dry	A 8	6.21'

Dam is in good condition

April 28, 2003

PO	Not taken due to surface water,		
P	102.2' Dry	PM 2	97.48'
P1	101.62'	PM 3	51.60' Dry
P2	112.74'	PM 4	41.02' Dry
P3	60.5' Dry	PM 5	49.84' Dry
P4	101.08'	PM 6	65.52' Dry
P5	104.17' Dry	A 8	3.41'
PM 1	50.02'		

Dam condition is good.

May 30, 2003

Dam inspection and Well Monitoring

PO	Unable to obtain due to surface water		
P ~~P1~~	102.2' Dry	PM 2	94.67'
P1 ~~P2~~	99.42'	PM 3	51.61' Dry
~~P1~~ P	103.62'	PM 4	40.94' Dry
P3	60.48' Dry	PM 5	49.82' Dry
P4	94.62'	PM 6	65.52' Dry
P5	103.47'	A 6	4.62'
PM 1	49.67'		

Channel and Dam are in good condition

6-14-03

Dam inspection and Well Monitoring

PO	.98'	PM 1	50.62'
P	102.2' Dry	PM 2	101.23'
P1	103.78' Dry	PM 3	51.60' Dry
P2	101.34'	PM 4	41.01' Dry
P3	60.5 Dry	PM 5	49.84' Dry
P4	103.28'	PM 6	65.52' Dry
P5	103.76'	A 8	6.22'

7-29-03

Dam inspection

PO	1.6'	PM 1	51.58'
P	102.2' Dry	PM 2	103.38'
P1	103.78' Dry	PM 3	51.62' Dry
P2	119.16'	PM 4	41.0' Dry
P3	60.48' Dry	PM 5	49.82' Dry
P4	105.87' Dry	PM 6	65.52' Dry
P5	104.17' Dry	A 8	7.39'

Channel & Dam are in good condition

Channel have channel and drain pipes of growth and obstructions

8-26-03

Dam inspection and Well Levels

PO	2.05 Dry	PM 1	51.62'
P	102.2' Dry	PM 2	108.42'
P1	103.78' Dry	PM 3	51.59' Dry
P2	119.42'	PM 4	41.02' Dry
P3	60.5' Dry	PM 5	49.84' Dry
P4	105.87' Dry	PM 6	65.52' Dry
P5	104.17'	A 8	7.68'

Sept. 23 2003

Dam inspection

PO	2.05 Dry	PM1	51.76
P	102.2 Dry	PM2	103.49
P1	103.78 Dry	PM3	51.60 Dry
P2	119.51	PM4	41.02 Dry
P3	60.5 Dry	PM5	49.821 Dry
P4	105.87 Dry	PM6	65.52 Dry
P5	104.17	A8	7.70'

Sept. 21, 2003

P-	102.2 Dry	PM 1 -	51.84
PO -	2.05 Dry	2 -	103.54
1 -	103.78 Dry	3 -	51.60 Dry
2 -	119.32	4 -	41.02 Dry
3.	60.5 Dry	5 -	49.84 Dry
4 -	105.87 Dry	6 -	65.52 Dry
5 -	104.18 Dry	A8 -	7.94

The Dam is in good condition with no visibly erosion. Drain channels are clear

Sept. 19, 2003

PO	2.05 Dry	PM 1 -	51.84
P	102.2 Dry	2 -	103.59
P 1	103.78 Dry	3 -	51.60 Dry
2	119.22	4 -	41.02 Dry
3	60.5 Dry	5 -	49.84 Dry
4	105.87 Dry	A8 -	7.90
5	104.18 Dry	6 -	65.52 Dry

12-10-04 Dam Inspection

PO- ~~102.2~~ 2.05 Dry
P- ~~102.2~~ 102.2 Dry
P1- 103.78 Dry
2- 119.44
3- 60.5 Dry
4- 105.87 Dry
5- 104.16 Dry

PM-1 - 51.86 Dry
2- 103.54
3- 51.60 Dry
4- 41.02 Dry
5- 49.84 Dry
6- 65.52 Dry
AB- 7.91

Inspection not done in Jan. due to weather.

Feb 12, 2004 Dam Inspection

PO - 2.05' Dry
P - 102.2' Dry
P1 - 103.78' Dry
2 - 119.45'
3 - 60.5' Dry
4 - 105.87 Dry
5 - 104.16 Dry

PM 1 - 51.82'
2 - 103.52'
3 - 51.60' Dry
4 - 41.02' Dry
5 - 49.84' Dry
6 - 65.52' Dry
AB - 7.80'

March 19, 2004 Dam Insp.

PO - 1.72' Surface Moist.
P - 102.2' Dry
P1 - 103.78' Dry
2 - 117.74'
3 - 60.5' Dry
4 - 105.26'
5 - 104.17' Dry

PM 1 - 51.68'
2 - 101.46'
3 - 51.60' Dry
4 - 41.02' Dry
5 - 49.84' Dry
6 - 65.52' Dry
AB - 6.82'

Dam is in good cond. - Some growth starting in drain channels

April 13, 2004

Dam Inspection

P0 -

P -

P1 -

P2 - Note: Unable to do in April due to access problems

P3 -

P4 -

P5 -

PM-1

PM2

PM3

PM4

PM5

PM6

A8

May 25, 2004

P	101.55 Dry
P-O	Surface Water - Not Measured
1	103.78 Dry
2	115.14 Water
3	60.51 Dry
4	104.01 Dry
5	104.14 Dry
PM-1	50.95 Water
2	101.34 Water
3	51.59 Dry
4	90.91 Dry
5	49.82 Dry
6	66.62 Dry
M-8	6.55 Water

Attachment 2

Dam Inspection Checklist Copies

NAME OF DAM Kootenai Development

INSPECTION DATE May 25, 2004

SPILLWAYS

1 of 1

AREA INSPECTED	ITEM NO.	CONDITION	OBSERVATIONS	CHECK ( ) ACTION NEEDED: MONITOR	INVESTIGATE	REPAIR
ERODIBLE CHANNEL	51	SLIDE, SLOUGH, SCARP	Good Condition			
	52	EROSION	No significant erosion in erodible channels			
	53	VEGETATION CONDITION	Good Cottonwoods in energy dissapation pool			X
	54	DEBRIS	None			
	55					
	56					
NON-ERODIBLE CHANNEL	57	SIDEWALLS	Good			
	58	CHANNEL FLOOR	Slight Crack (< 1/16") in floor of box culvert	X		
	59	UNUSUAL MOVEMENT	None			
	60	APPROACH AREA	Good Condition			
	61	WEIR OR CONTROL	Not applicable			
	62	DISCHARGE AREA	Trees in energy dissapation pool			X
	63	CRACK WIDTH IN BOTTOM OF BOX CULVERT THRU DAM	Unchanged, str. < 1/16"	X		
	64					
DROP INLET	65	INTAKE STRUCTURE	Good			
	66	TRASHRACK	Clear of debris			
	67	STILLING BASIN				
	68					
	69					

ADDITIONAL COMMENTS: REFER TO ITEM NO. IF APPLICABLE

NAME OF DAM Kootenai Development

INSPECTION DATE 5-25-2004

DOWNSTREAM AREA AND MISCELLANEOUS

1 OF 1

AREA INSPECTED	ITEM NO.	CONDITION	OBSERVATIONS	CHECK ( ) ACTION NEEDED: MONITOR	INVESTIGATE	REPAIR
DOWNSTREAM AREA	36	ABUTMENT LEAKAGE	None evident			
	37	FOUNDATION SEEPAGE	None evident, except out of Toe drains			
	38	SLIDE, SLOUGH, SCARP	Slight scarp on downslope face, vegitated, photographed.	X		
	39	DRAINAGE SYSTEM	Flowing properly, continue to clean moss and algae	X		
	40					
	41					
	42	DOWNSTREAM HAZARD DESCRIPTION				
	43	DATE OF LAST UPDATE OF EMERGENCY ACTION PLAN	January 1, 1999 (needs to be updated again)			X
MISCELLANEOUS	44	RESERVOIR SLOPES	Good Condition, one small erosion rill on upslope face	X		
	45	ACCESS ROADS	Good Condition			
	46	SECURITY DEVICES	Locked.			
	47					
	48					
	49					
	50					

ADDITIONAL COMMENTS: REFER TO ITEM NO. IF APPLICABLE

NAME OF DAM Kootenai Development

INSPECTION DATE 5-25-04

EMBANKMENT
1 of 2

AREA INSPECTED	ITEM NO.	CONDITION	OBSERVATIONS	CHECK ( ) ACTION NEEDED: MONITOR	INVESTIGATE	REPAIR
CREST	1	SURFACE CRACKING	None			
	2	CAVE IN, ANIMAL BURROW	None			
	3	LOW AREA(S)	None			
	4	HORIZONTAL ALIGNMENT	Good			
	5	RUTS AND/OR PUDDLES	None			
	6	VEGETATION CONDITION	Good			
	7					
	8					
UPSTREAM SLOPE	9	SLIDE, SLOUGH, SCARP	slight erosion scarp, vegetated, photographed	X		
	10	SLOPE PROTECTION	Good			
	11	SINKHOLE, ANIMAL BURROW	None			
	12	EMB.-ABUT. CONTACT	Good			
	13	EROSION	See #9 above			
	14	VEGETATION CONDITION	Good, excessive tree and brush growth			X
	15					
	16					

ADDITIONAL COMMENTS: REFER TO ITEM NO. IF APPLICABLE

NAME OF DAM Kootenai Development

INSPECTION DATE 5-25-04

EMBANKMENT
2 of 2

AREA INSPECTED	ITEM NO.	CONDITION	OBSERVATIONS	CHECK ( ) ACTION NEEDED: MONITOR	INVESTIGATE	REPAIR
DOWNSTREAM SLOPE	17	WET AREA(S) (NO FLOW)	None			
	18	SEEPAGE	None			
	19	SLIDE, SLOUGH, SCARP	Small erosion scarp vegitated photographed			
	20	EMB.-ABUT. CONTACT	Good			
	21	CAVE IN, ANIMAL BURROW	None			
	22	EROSION	See # 19 above			
	23	UNUSUAL MOVEMENT	None			
	24	VEGETATION CONTROL	Some trees and willows need to be removed			X
	25	REMOVAL OF TREES & SHRUBS WITH TRUNK DIAMETER LARGER THAN 2 INCHES	Required, See # 24 above and inspection report			X
	26					
INSTRUMENTATION	27	PIEZOMETERS/OBSERV. WELLS	Good Conditions, some are hard to Northeast, not labeled	X		
	28	STAFF GAUGE AND RECORDER	N/A			
	29	WEIRS	N/A			
	30	SURVEY MONUMENTS	N/A			
	31	DRAINS	Working properly			
	32	FREQUENCY READINGS	~~N/A~~ piezometer readings are in Logbook Since June 2003			
	33	LOCATION OF RECORDS	In W.R. Grace office.			
	34					
	35					

ADDITIONAL COMMENTS: REFER TO ITEM NO. IF APPLICABLE

Color Photo(s)

The following pages contain color that does not appear in the scanned images.

To view the actual images, contact the Region VIII Records Center at (303) 312-6473.

Attachment 3

Kootenai Development Impoundment Dam
May 25, 2005 Inspection

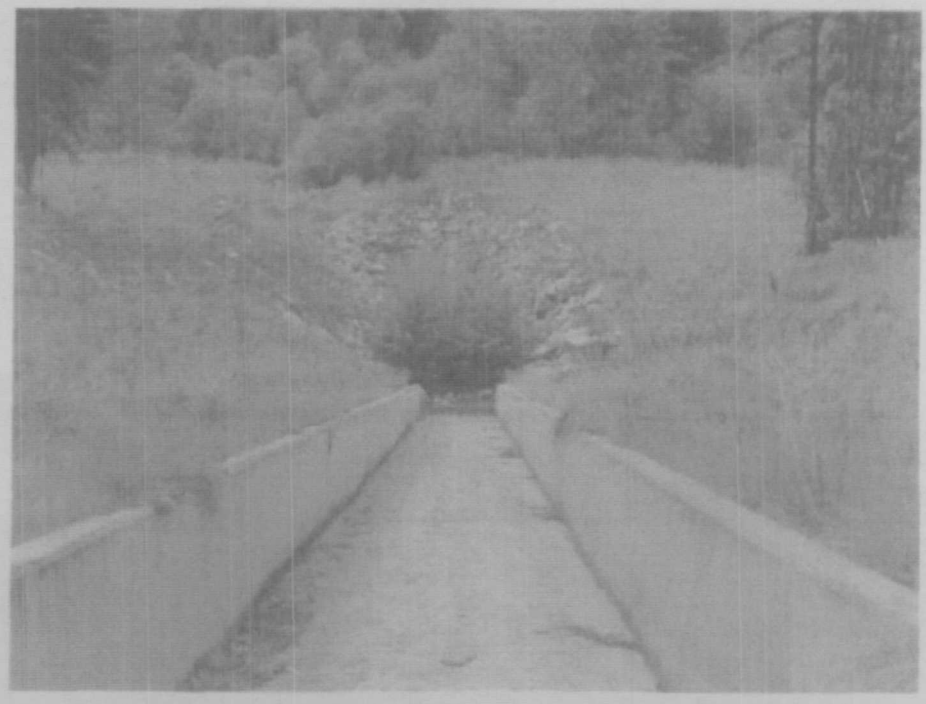
PHOTOGRAPHS

Photograph #1 – Impoundment Reservoir from Top of Dam

Photograph #2 – Piezometer Water Level Measurement

Photograph #3 – Small Erosion Rill – Upslope Face (near P5)

Photograph #4 – Shrub/Tree Growth – Upslope Face



Photograph #5 – Overflow Channel – Energy Dissipation Pool

Photograph #6 – Cottonwoods in Energy Dissipation Pool

Photograph #7 – Erosion Rill on Down-slope Face

Photograph #8 – Willows near Toe Drain Outlet

Photograph #9 – Larger Pine Tree on Down-slope Face

KOOTENAI DEVELOPMENT IMPOUNDMENT

INSPECTION FORMS & LOGS

KOOTENAI DEVELOPMENT IMPOUNDMENT

INSPECTION FORMS AND LOGS

Preprinted forms have been developed for use during the inspections of the Kootenai Development Impoundment and Dam. These forms are to be used during each inspection and photo documentation is to be included with every inspection. In the event trash or vegetation is removed during a routine inspection, photos before and after such clearing should be taken and become part of the inspection report.

The following forms have been developed and are included in this section:

1. Routine Inspections (weather permitting)
2. Annual Inspections
3. Dam Incident Report Form
4. Periodic Investigations
5. Operations Log Sheet

All inspection/dam incident reports will be noted on the Operations Log Sheet. In addition to logging the reports, a summary of the required actions necessary for remedy and completion date of remedy are to be included in this log.

KOOTENAI DEVELOPMENT IMPOUNDMENT
ROUTINE INSPECTION REPORT

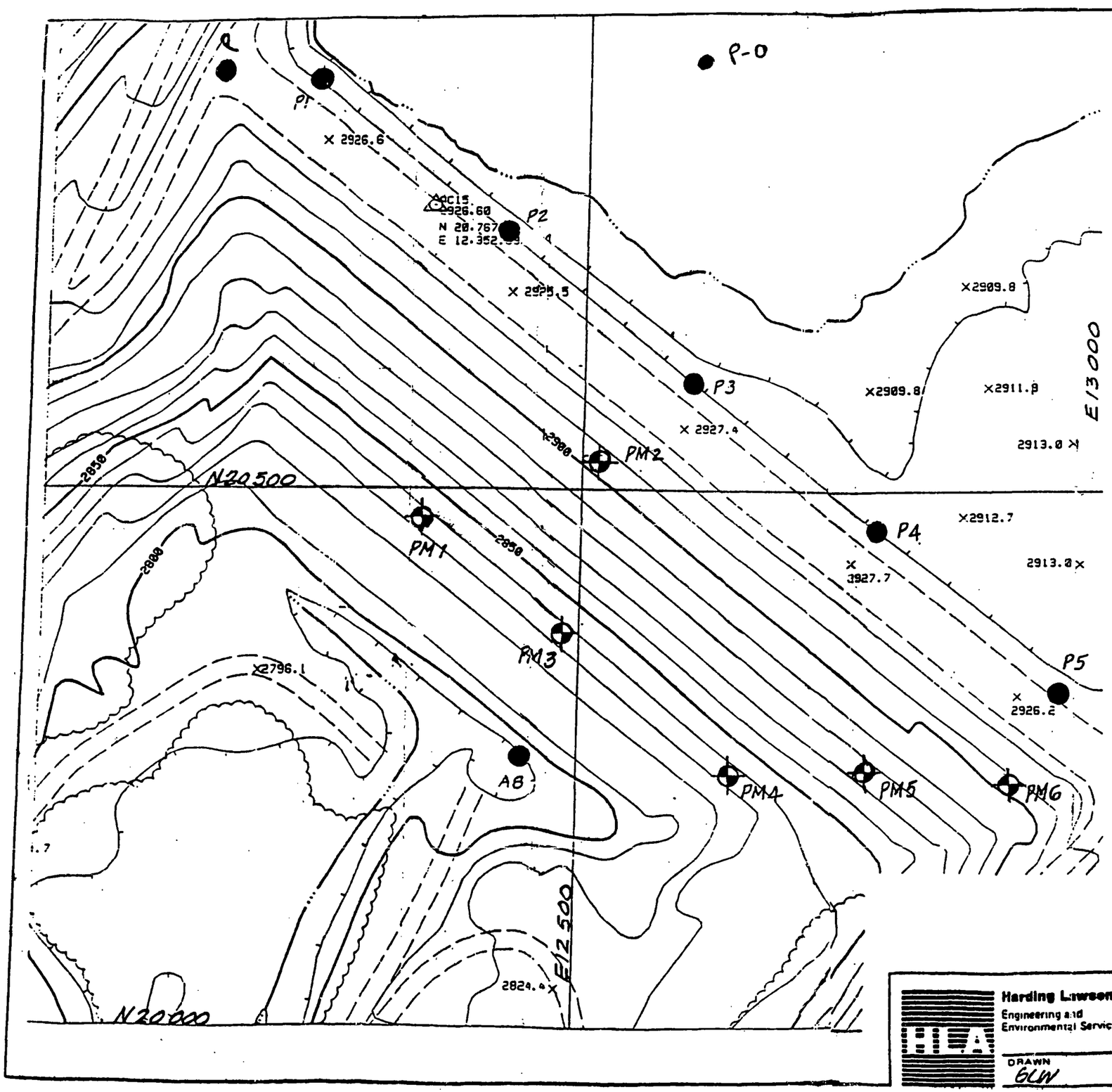
Dam Inspector(s):_____ Inspection Date: _____

Reservoir Elevation: _____ Weather Conditions:_____

PIEZOMETER READINGS (See Attached Drawing for Locations)							
Piezo-meter ID	Depth Measured	Water Level	Dry	Piezo-meter ID	Depth Measured	Water Level	Dry
P0				PM1			
P				PM2			
P1				PM3			
P2				PM4			
P3				PM5			
P4				PM6			
P5				A-8			

FINDINGS				
Inlet Box Culvert				
Outlet Box Culvert				
Emergency Spillway Inlet				
Plunge Pool				
Toe Drains				
Dam Observations				
Areas of Concern				
Photos Taken		Yes		No

Signatures _____ _____



Explanation

P1 - Location of previously installed piezometer

PM1 - Recommend location of additional piezometer for monitoring downslope face of embankment

Reference: Topographic map prepared by Walker + Associates, Inc., untitled, undated.

Scale: 1" = 100'

Harding Lawson Associates
Engineering and Environmental Services

Recommended Piezometer Locations
W. R. Grace Dam
Rainy Creek, Montana

PLATE 1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
GLW	10674-055	GLW	9/92	

000472

KOOTENAI DEVELOPMENT IMPOUNDMENT

Annual Earthen Dam Owner's Observation Report

Purpose: 1)Identify Maintenance Needs 2.) Record Observations on dam condition

Dam Name: _____

Dam Observer: _____ **Observation Date:** _____

Reservoir Elevation: _____ **Weather Conditions:** _____

Area to be Examined	Observations	Recommended Action	Date to be completed
Embankment Crest			
surface cracks			
animal burrows			
low areas			
vegetation			
ruts			
other			
Downstream Slope			
wet areas/seepage			
slides/depressions etc.			
animal burrows			
erosion			
vegetation			
other			
Upstream Slope			
vegetation			
erosion,slides, sinkholes etc.			
slope protection			
Spillway			
Chute condition			
Sidewall conditions			
Spillway entrance			
Spillway toe			
other			

KOOTENAI DEVELOPMENT IMPOUNDMENT DAM

DAM INCIDENT REPORT FORM

DATE: _____ TIME: _____

NAME OF DAM: _____

STREAM NAME: _____

LOCATION: _____

COUNTY: _____

OBSERVER: _____

OBSERVER TELEPHONE: _____

NATURE OF PROBLEM: _____

_____

LOCATION OF PROBLEM AREA (Looking Downstream): _____

_____

EXTENT OF PROBLEM AREA: _____

FLOW QUANTITY AND COLOR: _____

WATER LEVEL IN RESERVOIR: _____

IS SITUATION WORSENING? _____

EMERGENCY STATUS: _____

CURRENT WEATHER CONDITIONS: _____

ADDITIONAL COMMENTS _____

KOOTENAI DEVELOPMENT IMPOUNDMENT
DAM PERIODIC INVESTIGATION

Dam Name: _____

Dam Observer: _____ **Observation Date:** _____

Reservoir Elevation: _____ **Weather Conditions:** _____

AREA INSPECTED	EMBANKMENT			CHECK ACTION NEEDED		
	ITEM NO.	CONDITION	OBSERVATIONS	MONITOR	INVESTI-GATE	REPAIR
CREST	1	SURFACE CRACKING				
	2	CAVE IN, ANIMAL BURROW				
	3	LOW AREA(S)				
	4	HORIZONTAL ALIGNMENT				
	5	RUTS AND/OR PUDDLES				
	6	VEGETATION CONDITION				
	7					
	8					
UPSTREAM SLOPE	9	SLIDE, SLOUGH, SCARP				
	10	SLOPE PROTECTION				
	11	SINKHOLE, ANIMAL BURROW				
	12	EMB-ABUT CONTACT				
	13	EROSION				
	14	VEGETATION CONDITION				
	15					
	16					

ADDITIONAL COMMENTS: REFER TO ITEM NO., IF APPLICABLE

KOOTENAI DEVELOPMENT IMPOUNDMENT
DAM PERIODIC INVESTIGATION

Dam Name: _____

Dam Observer: _____ Observation Date: _____

Reservoir Elevation: _____ Weather Conditions: _____

AREA INSPECTED	EMBANKMENT (CONT'D)			CHECK ACTION NEEDED		
	ITEM NO.	CONDITION	OBSERVATIONS	MONITOR	INVESTI-GATE	REPAIR
DOWNSTREAM SLOPE	17	WET AREA(S) (NO FLOW)				
	18	SEEPAGE				
	19	SLIDE, SLOUGH, SCARP				
	20	EMB-ABUT CONTACT				
	21	CAVE IN, ANIMAL BURROW				
	22	EROSION				
	23	UNUSUAL MOVEMENT				
	24	VEGETATION CONDITION				
	25	REMOVAL OF TREES/SHRUBS (a)				
	26					
INSTRUMENTATION	27	PIEZOMETERS/OBSERV. WELLS				
	28	STAFF GAUGE AND RECORDER				
	29	WEIRS				
	30	SURVEY MONUMENTS				
	31	DRAIN'S				
	32	FREQUENCY READINGS				
	33	LOCATION OF RECORDS				
	34					

ADDITIONAL COMMENTS: REFER TO ITEM NO., IF APPLICABLE

(a) Trunk diameters larger than 2 inches.

KOOTENAI DEVELOPMENT IMPOUNDMENT
DAM PERIODIC INVESTIGATION

Dam Name: _____

Dam Observer: _____ **Observation Date:** _____

Reservoir Elevation: _____ **Weather Conditions:** _____

AREA INSPECTED	DOWNSTREAM AREA & MISCELLANEOUS			CHECK ACTION NEEDED		
	ITEM NO.	CONDITION	OBSERVATIONS	MONITOR	INVESTI-GATE	REPAIR
DOWNSTREAM AREA	35	ABUTMENT LEAKAGE				
	36	FOUNDATION SEEPAGE				
	37	SLIDE, SLOUGH, SCARP				
	38	DRAINAGE SYSTEM				
	39					
	40					
	41	HAZARD DESCRIPTION				
	42	DATE OF LAST UPDATE OF EAP				
MISCELLANEOUS	43	RESERVOIR SLOPES				
	44	ACCESS ROADS				
	45	SECURITY DEVICES				
	46					
	47					
	48					
	49					
	50					

ADDITIONAL COMMENTS: REFER TO ITEM NO., IF APPLICABLE

KOOTENAI DEVELOPMENT IMPOUNDMENT
DAM PERIODIC INVESTIGATION

Dam Name: _____

Dam Observer: _____ **Observation Date:** _____

Reservoir Elevation: _____ **Weather Conditions:** _____

AREA INSPECTED	SPILLWAYS			CHECK ACTION NEEDED		
	ITEM NO.	CONDITION	OBSERVATIONS	MONITOR	INVESTI-GATE	REPAIR
ERODIBLE CHANNEL	51	SLIDE, SLOUGH, SCARP				
	52	EROSION				
	53	VEGETATION CONDITION				
	54	DEBRIS				
	55					
	56					
NON-ERODIBLE CHANNEL	57	SIDEWALLS				
	58	CHANNEL FLOOR				
	59	UNUSUAL MOVEMENT				
	60	APPROACH AREA				
	61	WEIR OR CONTROL				
	62	DISCHARGE AREA				
	63	CRACK WIDTH-BOX CULVERT (a)				
	64					
DROP INLET	65	INTAKE STRUCTURE				
	66	TRASH RACK				
	67	STILLING BASIN				
	68					
	69					

ADDITIONAL COMMENTS: REFER TO ITEM NO., IF APPLICABLE

(a) Bottom of box culvert through dam.

KOOTENAI DEVELOPMENT IMPOUNDMENT

OPERATIONS LOG

NUMBER	DATE	EVENT OR COMMENT	INITIALS
1		Activity:	
		Finding:	
		Action Required:	
		Remedy Completion Date:	
2		Activity:	
		Finding:	
		Action Required:	
		Remedy Completion Date:	
3		Activity:	
		Finding:	
		Action Required:	
		Remedy Completion Date:	
4		Activity:	
		Finding:	
		Action Required:	
		Remedy Completion Date:	
5		Activity:	
		Finding:	
		Action Required:	
		Remedy Completion Date:	
6		Activity:	
		Finding:	
		Action Required:	
		Remedy Completion Date:	